

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **2001-113723**

(43)Date of publication of application : **24.04.2001**

(51)Int.Cl.

B41J 2/175

(21)Application number : **11-320145**

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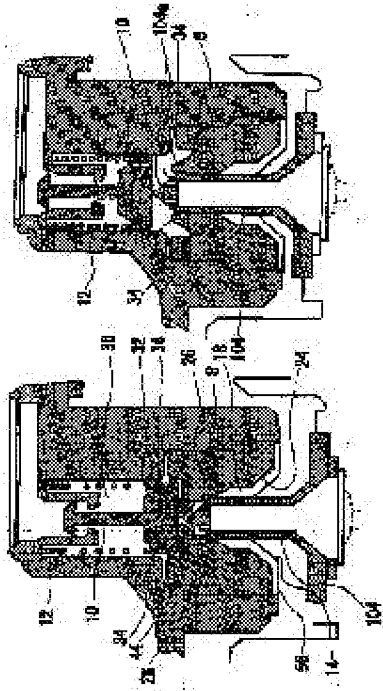
(22)Date of filing : **10.11.1999**

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(30)Priority

|                                   |                                   |                              |
|-----------------------------------|-----------------------------------|------------------------------|
| Priority number : <b>10320113</b> | Priority date : <b>11.11.1998</b> | Priority country : <b>JP</b> |
| <b>11056676</b>                   | <b>04.03.1999</b>                 | <b>JP</b>                    |
| <b>11228430</b>                   | <b>12.08.1999</b>                 | <b>JP</b>                    |

(54) **INK JET RECORDER AND INK CARTRIDGE**



(57)Abstract:

**PROBLEM TO BE SOLVED:** To supply ink from an ink chamber by means of an ink supplying needle having a tapered tip without making an ink supplying port complicated for supplying the ink to a recording head of a recorder from the ink chamber through the ink supplying hole.

**SOLUTION:** A cylindrical packing 8, which forms an ink passage for passing ink therethrough and is fit to an ink supplying needle 104 on a recorder and a valve 10 for selectively closing the ink passage by elastically being connected to the cylindrical packing 8, are provided to an ink supplying hole 6. The valve 10 is elastically urged to the cylindrical packing 8 by a spring 12 and is opened by the ink supplying needle 104 having a tapered tip.

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## LEGAL STATUS

[Date of request for examination] 03.02.2003

[Date of sending the examiner's decision of rejection] 15.11.2005

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection] 2005-24044

[Date of requesting appeal against examiner's decision of rejection] 14.12.2005

[Date of extinction of right]

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CLAIMS

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[Claim(s)]

[Claim 1] It is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The ink cartridge characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle.

[Claim 2] It is used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, The ink cartridge characterized by for said ink supply needle pressing said valve element to abbreviation coincidence, and enabling supply of the ink from said ink room at it if said ink supply needle forms said tubed packing and fluid-tight condition by penetration of a preparation and the ink supply needle of said recording device.

[Claim 3] The ink cartridge according to claim 2 to which said valve element will close said tubed packing to abbreviation coincidence if the ink supply needle of said recording device retreats till the critical point when the ink supply needle and said tubed packing of said recording device can hold a fluid-tight condition.

[Claim 4] It is used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The porosity member which is held in an ink room and sinks in ink, and the ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The ink cartridge characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage

alternatively in response to migration of said ink supply needle.

[Claim 5] It is used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, The ink cartridge characterized by forming said valve element and the tubed heights which \*\*\*\* in the front face by the side of said ink room of a preparation and said tubed packing.

[Claim 6] The ink cartridge according to claim 5 in which the tubed crevice which holds said a part of valve element in the front face by the side of said ink room of said tubed packing was formed.

[Claim 7] The ink cartridge according to claim 5 by which the pleat was formed in said ink room side of said tubed packing.

[Claim 8] It is used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, It is the ink cartridge which has the valve element section to which a preparation and said valve element contact said tubed packing, and is characterized by this valve element section being plate-like substantially.

[Claim 9] It is used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, The valve element section to which a preparation and said valve element contact the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, The ink cartridge characterized by having the guide member which guides said valve element section movable almost perpendicularly to said tubed packing.

[Claim 10] Claims 1, 2, and 4 equipped with the valve body with which said valve element contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the elastic member which energizes this valve body on the front face by the side of said ink room of said tubed packing, or an ink cartridge given in either of 5.

[Claim 11] The ink cartridge according to claim 10 in which said valve body has an attaching part holding said elastic member.

[Claim 12] The ink cartridge according to claim 11 said whose attaching part is a radial.

[Claim 13] The ink cartridge according to claim 10 in which said valve body has a flange holding said elastic member.

[Claim 14] Claims 1, 2, 4, 5, and 8 by which the taper section which guides the ink supply needle of said recording device was formed in the front face by the side of said external opening of said tubed packing, or an ink cartridge given in either of 9.

[Claim 15] The ink cartridge according to claim 14 to which said taper section fits into the perimeter of said ink supply needle.

[Claim 16] Claims 1, 2, 4, 5, and 8 by which the fitting section which fits into the perimeter of the ink supply needle of said recording device was formed in the front face by the side of said external opening of said tubed packing, or an ink cartridge given in either of 9.

[Claim 17] Claims 1, 2, 4, 5, and 8 by which the layer of a glide plane agent was formed in the field to which said tubed packing is constituted by the spring material, and said ink supply needle touches at least, or an ink cartridge given in either of 9.

[Claim 18] The ink cartridge according to claim 9 which has the closure section in which said valve element section closes the ink from said ink room when said valve element \*\*\*\* with said tubed packing, and the ink passage which passes the ink from said ink room when said valve element section is pressed by the ink supply needle of said recording device and separates said tubed packing and distance.

[Claim 19] The ink cartridge according to claim 18 in which said ink passage excised said closure section, and was formed.

[Claim 20] The ink cartridge according to claim 18 said whose closure section is plate-like.

[Claim 21] The ink cartridge according to claim 9 in which said guide member has the shaft connected to said valve element section, and the stopper which is formed in free one end of this shaft, and guides said valve element section movable almost perpendicularly to said tubed packing.

[Claim 22] The ink cartridge according to claim 21 by which the shaft of said guide member is formed in said valve element section and one.

[Claim 23] The ink cartridge according to claim 21 further equipped with the interior of a proposal which is installed in said ink feed hopper, engages with said stopper of said guide member, and guides said valve element section movable almost perpendicularly to said tubed packing.

[Claim 24] The ink cartridge according to claim 9 which said valve element section and said guide member are constituted as two-body structure, and fix by the means for detachable.

[Claim 25] The ink cartridge according to claim 9 by which said valve element section and said guide member are formed in one.

[Claim 26] The ink cartridge according to claim 9 in which said guide member of said valve element is formed of elastic material.

[Claim 27] An ink cartridge according to claim 21 with a slot in accordance with said stopper to said shaft while said guide member of said valve element is formed of elastic material.

[Claim 28] The ink cartridge according to claim 9 by which the height was formed in the field which counters said tubed packing of the valve element section of said valve element.

[Claim 29] The ink cartridge according to claim 9 by which the projection which contacts at the tip of said ink supply needle was formed in the field which counters said tubed packing of the

valve element section of said valve element.

[Claim 30] Claim 8 by which the cut section was formed in the field which counters said tubed packing of the valve element section of said valve element, or an ink cartridge given in either of 9.

[Claim 31] The ink cartridge according to claim 30 by which the aforementioned cut section of said valve element section was formed in whenever [ taper-like part / of said ink supply needle /, and isogonism ] when the tip of said ink supply needle was a taper-like.

[Claim 32] The ink cartridge according to claim 30 by which the aforementioned cut section of said valve element section was formed in whenever [ acute-angle ] rather than the taper-like part of said ink supply needle when the tip of said ink supply needle was a taper-like.

[Claim 33] Claim 8 by which the spherical-surface section is formed in the field which contacts said tubed packing of the valve element section of said valve element, or an ink cartridge given in either of 9.

[Claim 34] An ink cartridge according to claim 33 with the larger curvature diameter of said spherical-surface section of said valve element than the diameter at the maximum equator at the time of cutting said valve element section in respect of being level to said tubed packing.

[Claim 35] The ink cartridge according to claim 8 in which the annular heights which have the through tube of a minor diameter in the front face by the side of said ink room of said tubed packing rather than the periphery of the ink supply needle of said recording device were formed.

[Claim 36] Claim 8 whose part in contact with the ink supply needle of said valve element is a flat surface, or an ink cartridge given in either of 11.

[Claim 37] Claims 1, 2, and 4 equipped with the elastic holddown member which fixes flexibly to the front face by the side of said ink room of said tubed packing the valve element section to which said valve element contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and said a part of valve element section, or an ink cartridge given in either of 5.

[Claim 38] Claims 1, 2, 4, 5, and 8 which have further a fixed means to fix said tubed packing to external opening of said ink feed hopper, or an ink cartridge given in either of 9.

[Claim 39] The ink cartridge according to claim 38 said whose fixed means is the film which can insert in the ink supply needle of said recording device.

[Claim 40] The ink cartridge according to claim 39 by which the through-hole which easy-izes insertion of the ink supply needle of said recording device is formed in said film.

[Claim 41] The ink cartridge according to claim 40 in which said through-hole cuts said film deeply in a cross-joint mold, and is formed.

[Claim 42] The ink cartridge according to claim 38 said whose fixed means is the piece of a stop which projects in a core side from said external opening.

[Claim 43] The ink cartridge according to claim 16 which consists of the 1st fitting means to which said fitting section fits into said ink supply needle and beginning when the ink supply needle of said recording device advances from said external opening, and the 2nd fitting means which fits in with said ink supply needle when said ink supply needle advances further.

[Claim 44] The ink cartridge according to claim 43 to which the seal of said 1st fitting means is carried out by the initial stage.

[Claim 45] It is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink supply way which is the ink distribution system which can supply the ink of the ink hold section, and supplies ink to said recording head from said ink hold section through said supply needle at the recording head of

said recording device, The part I material which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink supply way, and passes ink, The ink distribution system characterized by having the part II material which is held in said ink supply way, \*\*\*\* with said part I material, and closes said ink passage alternatively.

[Claim 46] In the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through said ink supply needle to the ink supply needle with which the tip was formed in the shape of a taper, and said recording head, and said recording head is received. A removable ink cartridge, The ink room in which it \*\*\*\* and said ink cartridge holds ink, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while having the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The recording device characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively.

[Claim 47] A recording device [ equipped with the valve body with which said valve element contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the elastic member which energizes this valve body on the front face by the side of said ink room of said tubed packing ] according to claim 46.

[Claim 48] In the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through said ink supply needle to an ink supply needle and said recording head, and said recording head is received. A removable ink cartridge, The ink room in which it \*\*\*\* and said ink cartridge holds ink, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, It is the recording device which has the valve element section to which a preparation and said valve element contact said tubed packing, and is characterized by this valve element section being plate-like substantially.

[Claim 49] In the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through said ink supply needle to an ink supply needle and said recording head, and said recording head is received. A removable ink cartridge, The ink room in which it \*\*\*\* and said ink cartridge holds ink, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, The recording device characterized by having the valve element section to which a preparation and said valve element contact the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the guide member which guides said valve element section movable almost perpendicularly to said tubed packing.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] the thing about the ink jet type recording device which this invention supplies ink to a recording head through the ink supply needle with which the tip was formed in the shape of a taper, and carries out the regurgitation of the ink droplet to a record medium -- it is -- especially -- said recording head -- receiving -- repeating -- attachment and detachment -- it is related with the recording device which has an usable ink cartridge and an ink distribution system.

[0002]

[Description of the Prior Art] Generally, it connects with an ink cartridge through the ink feeder current way of a recording apparatus, and the recording head of an ink jet type recording apparatus is constituted so that supply of ink may be received from an ink cartridge. And in order to enable supply of ink, an ink feed hopper is formed in an ink cartridge, and a hollow needle is formed in an ink feeder current way, and it is constituted so that a hollow needle may be inserted in an ink feed hopper and it may be made to join together by wearing of an ink cartridge.

[0003] By the way, the recording head of the type using a piezoelectric transducer as an ink pressurization means of the pressure generating room of a recording head has weak welding pressure compared with the recording head of the type which uses a heater element as an ink pressurization means. Then, since welding pressure is increased, the ink which carried out degassing processing is held in the ink cartridge used for the recording head of the type using a piezoelectric transducer as an ink pressurization means. Therefore, also when the ink feed hopper of an ink cartridge is inserted and equipped with an ink supply needle, it is necessary to maintain the airtight condition in an ink cartridge.

[0004] Moreover, when the porosity member which sinks ink into the ink room in which ink is held within an ink cartridge is introduced, negative pressure always occurs in the ink interior of a room. Therefore, also when an ink supply needle is drawn out from the ink feed hopper of an ink cartridge, it is necessary to close so that neither air bubbles nor air may enter in an ink cartridge.

[0005] The sectional view of such an ink cartridge and an ink feeder current way is shown in drawing 27. The ink feed hopper 114 of an ink cartridge 112 is loaded with the tubed packing 120 which fits into the perimeter of the ink supply needle 118 which is open for free passage to a recording head 116 elastically. Although the ink feed hopper 114 is not illustrated, before use, the closure is carried out with a closure film etc., and ink is not beginning to leak [ come ]. And by the ink supply needle's 118 inserting at the time of use, and equipping the ink feed hopper 114 at it, a closure film is opened and ink is supplied to a recording head 116 through the ink supply needle 118.

[0006] For this reason, in the condition that ink remains in the ink cartridge, if an ink cartridge is removed from a recording device, the airtight condition of the ink cartridge currently maintained by fitting of the ink supply needle 118 and the tubed packing 120 will be canceled. Therefore, it was in the middle of use, and when the ink cartridge was removed from the recording device, ink began to leak from an ink feed hopper, and there was a possibility that air and air bubbles might invade in an ink cartridge conversely. That is, an ink cartridge was not able to be removed until it exhausted the ink in an ink cartridge.

[0007] Therefore, according to liking, a user is in the middle of use, and was not able to exchange two or more sorts of ink cartridges repeatedly.

[0008] In order to solve such a problem, for example, as shown in JP,9-174876,A, the ink cartridge whose attitude always energized to the slit the ball which prepared the slit of the septum made from an elastic body at the tip of an ink feed hopper, and was prepared in the ink cartridge inside by means of a spring, and was enabled is proposed.

[0009] Since a ball \*\*\*\* to a slit and the closure of the ink feed hopper is carried out while a slit is closed down when according to this a ball can be retreated, and an ink feeder current way can be opened and a hollow needle is extracted from a slit by inserting the hollow needle of a recording apparatus in a slit, the ink from an ink cartridge begins to leak and the air into a \*\* ink cartridge and invasion of air bubbles are prevented.

[0010]

[Problem(s) to be Solved by the Invention] However, when it is going to take seal structure as shown in the ink cartridge which takes structure as shown in drawing 27 at JP,9-174876,A, there is a problem that the structure of an ink feed hopper is complicated.

[0011] On the other hand, an exhaust port is equipped with packing (rubber stopper), and the ink cartridge which held the solid sphere (ball) which is \*\*\*\*(ed) by means of a spring by the front face by the side of the ink room of packing, and retreats from the front face of packing by insertion of a tubed splicer is proposed in the ink cartridge which supplies ink to a recording head from an ink room through the splicer and packing which are open for free passage to a recording head so that JP,5-229137,A may see. The sectional view of the ink cartridge which starts drawing 28 at JP,5-229137,A is shown.

[0012] packing 134 is installed in that exhaust port 132, and this ink cartridge closes packing 134 -- as -- a solid sphere -- 136 is energized with the spring 138 in the packing 134 direction.

[0013] although the packing 134 which fits into a splicer elastically and maintains airtightness can be used as a valve seat according to this -- a valve element -- a solid sphere -- since it is constituted by 136 -- a spring 138 and a solid sphere -- there is a possibility that the physical relationship of 136 may become very unstable and it may become difficult to acquire the positive closure force. moreover, a splicer -- the tip -- a solid sphere -- a possibility of causing un-arranging is also in the desorption to the packing 134 of a splicer on the need of forming in the configuration where 136 can be held and where the cross section is large. furthermore, the packing 134 -- a solid sphere -- since 136 is pushed in, the bore of packing 134 is expanded with the passage of time, and there is also fear of the closure force over the splicer in a wearing condition declining.

[0014] It is offering the ink cartridge which can open certainly with the ink supply needle with which the tip's was formed in the shape of a taper at the time of the use with which this invention's is made in view of such a problem, and the purpose's closes an ink feed hopper certainly at the time of un-using [ with which a recording device is not equipped, without reducing the closure force of tubed packing ] it, and a recording device's is equipped.

[0015]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the first gestalt of this invention It is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It

is characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle.

[0016] Moreover, this ink cartridge may have the porosity member which sinks in the ink held in the ink room.

[0017] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, If said ink supply needle forms said tubed packing and fluid-tight condition by penetration of a preparation and the ink supply needle of said recording device, it will be characterized by for said ink supply needle pressing said valve element to abbreviation coincidence, and enabling supply of the ink from said ink room at it.

[0018] Moreover, if the ink supply needle of said recording device retreats till the critical point when, as for this ink cartridge, the ink supply needle and said tubed packing of said recording device can hold a fluid-tight condition, said valve element will close said tubed packing to abbreviation coincidence.

[0019] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It holds in said ink feed hopper, has the valve element which \*\*\*\* with said tubed packing and closes said ink passage alternatively in response to migration of said ink supply needle, and is characterized by forming tubed heights in the front face by the side of said ink room of said tubed packing.

[0020] The tubed crevice which holds said a part of valve element in the front face by the side of said ink room of said tubed packing may be formed.

[0021] The pleat may be formed in said tubed crevice of said tubed packing.

[0022] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It holds in said ink feed hopper, has the valve element which \*\*\*\* with said tubed packing and closes said ink passage alternatively in response to migration of said ink supply needle, and has the valve element section to which said valve element contacts said tubed

packing, and this valve element section is characterized by being plate-like substantially.

[0023] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, A preparation and said valve element are characterized by having the valve element section which contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the guide member which guides said valve element section movable almost perpendicularly to said tubed packing.

[0024] Said valve element may be equipped with the valve body which contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the elastic member which energizes this valve body on the front face by the side of said ink room of said tubed packing.

[0025] Said valve body may have an attaching part holding said elastic member, or a flange, and said attaching part may be a radial.

[0026] The taper section which guides the ink supply needle of said recording device may be formed in the front face by the side of said external opening of said tubed packing. Said taper section may fit into the perimeter of said ink supply needle. The fitting section which fits into the perimeter of the ink supply needle of said recording device may be formed in the front face by the side of said external opening of said tubed packing.

[0027] Said tubed packing may be constituted by the spring material and the layer of a glide plane agent may be formed in the field to which said ink supply needle touches at least.

[0028] Said valve element section may have the closure section which closes the ink from said ink room when this valve element section \*\*\*\* with said tubed packing, and the ink passage which passes the ink from said ink room when said valve element section is pressed by the ink supply needle of said recording device and separates said tubed packing and distance. Said ink passage excises said closure section, and may be formed. Said closure section may be plate-like.

[0029] Said guide member is formed in free one end of the shaft connected to said valve element section, and this shaft, and may have the stopper which guides said valve element section movable almost perpendicularly to said tubed packing. The shaft of said guide member may be formed in said valve element section and one.

[0030] This ink cartridge is installed in said ink feed hopper, and may be further equipped with the interior of a proposal which engages with said stopper of said guide member, and guides said valve element section movable almost perpendicularly to said tubed packing.

[0031] Said valve element section and said guide member are constituted as two-body structure, and may fix by the means for detachable. Said valve element section and said guide member may be formed in one. Said guide member of said valve element may be formed of elastic material. While said guide member of said valve element is formed of elastic material, in accordance with said shaft, you may have a slot from said stopper.

[0032] The height may be formed in the field which counters said tubed packing of the valve element section of said valve element. The projection which contacts at the tip of said ink supply

needle may be formed in the field which counters said tubed packing of the valve element section of said valve element.

[0033] The cut section may be formed in the field which counters said tubed packing of the valve element section of said valve element. The aforementioned cut section of said valve element section may be formed in whenever [ taper-like part / of said ink supply needle /, and isogonism ], and may be formed in whenever [ acute-angle ] rather than the taper-like part of said ink supply needle.

[0034] The spherical-surface section may be formed in the field which contacts said tubed packing of the valve element section of said valve element.

[0035] The curvature diameter of said spherical-surface section of said valve element may be larger than the diameter at the maximum equator at the time of cutting said valve element section in respect of being level to said tubed packing.

[0036] The annular heights which have the through tube of a minor diameter in the front face by the side of said ink room of said tubed packing rather than the periphery of the ink supply needle of said recording device may be formed.

[0037] The flat-surface section of a minor diameter may be formed in the core of the spherical-surface section of said valve element rather than the through tube of said annular heights.

[0038] Said valve element may be equipped with the elastic holddown member which fixes flexibly to the front face by the side of said ink room of said tubed packing the valve element section which contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and said a part of valve element section. Said elastic holddown member may be formed by said valve element section and one. Said valve element may be formed by said tubed packing and one.

[0039] You may have further a fixed means to fix said tubed packing to external opening of said ink feed hopper. You may be the film in which said fixed means can insert the ink supply needle of said recording device, and the through-hole which easy-izes insertion of the ink supply needle of said recording device may be formed in the film. Furthermore, said through-hole cuts said film deeply in a cross-joint mold, and may be formed.

[0040] Said fixed means may be a piece of a stop which projects in a core side from said external opening.

[0041] Said ink feed hopper may have internal opening which carries out opening to an ink room, and may have further the filter installed in this internal opening. It is desirable that the area of said internal opening is larger than the area of the valve element section of said valve element.

[0042] You may consist of the 1st fitting means to which said fitting section fits into said ink supply needle and beginning when the ink supply needle of said recording device advances from said external opening, and the 2nd fitting means which fits in with said ink supply needle when said ink supply needle advances further. The seal of said 1st fitting means may be carried out by the initial stage.

[0043] In order to solve the above-mentioned technical problem, the second gestalt of this invention It is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink supply way which is the ink distribution system which can supply the ink of the ink hold section, and supplies ink to said recording head from said ink hold section through said supply needle at the recording head of said recording device, It is characterized by having the part II material which is held in said ink supply way with the ink supply needle of said recording device, and the part I material which fits in, \*\*\*\* with said part I material while forming the ink passage which it is installed [ passage ] in

said ink supply way, and passes ink, and closes said ink passage alternatively.

[0044] In the condition of having fitted into extent in which said ink supply needle forms said part I material and fluid-tight condition by penetration of the ink supply needle of said recording device, said ink supply needle presses said part II material, and this ink distribution system enables supply of the ink from said ink hold section. Furthermore, when the ink supply needle of said recording device retreats till the critical point when, as for this ink distribution system, the ink supply needle and said part I material of said recording device can hold a fluid-tight condition, said part II material closes said part I material.

[0045] In order to solve the above-mentioned technical problem, the third gestalt of this invention In the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through said ink supply needle to the ink supply needle with which the tip was formed in the shape of a taper, and said recording head, and said recording head is received. A removable ink cartridge, The ink room in which it \*\*\*\* and said ink cartridge holds ink, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room through this external opening, Tubed packing which fits in with the ink supply needle of said recording device while having the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It is characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively.

[0046]

[Embodiment of the Invention] Although this invention is hereafter explained through the gestalt of implementation of invention, not all the combination of the description of the following operation gestalten that do not limit invention concerning a claim and are explained in the operation gestalt is necessarily indispensable for the solution means of invention.

[0047] One example of the ink cartridge which starts this invention at drawing 1 is shown. The ink cartridge 2 has the ink room 4 in which ink is held, the ink room 4, and the ink feed hopper 6 open for free passage. The tubed packing 8 is installed in the ink feed hopper 6, and a valve element 10 is held between the tubed packing 8 and the ink room 4, and it is energized so that it may \*\*\*\* with the tubed packing 8 by the compression spring 12. The tubed packing 8 consists of elastic members, such as rubber and synthetic resin. The porosity member 5 which sinks in ink is held in the ink room 4. Since ink sinks into the porosity member 5, in case an ink cartridge is carried in the carriage of a recording apparatus and vibrates with a reciprocating motion, for example, ink is held fixed in the ink interior of a room. Moreover, since the porosity member 5 is held in the ink room 4, the inside of the ink room 4 is always maintained at negative pressure.

[0048] Some recording devices are shown in drawing 1 . A recording apparatus is open for free passage with the recording head 102 fixed on the carriage which is not illustrated, and a recording head 102, and has the ink supply needle 104 with which the tip was formed in the shape of a taper, and the ink cartridge attaching part 106. An ink cartridge 2 is held at the ink cartridge attaching part 106 of a recording apparatus so that the ink feed hopper 6 may counter the ink supply needle 104 of a recording apparatus, and a recording apparatus is equipped with it when the tubed packing 8 arranged in the ink feed hopper 6 fits in with the ink supply needle 104. At this time, ink is supplied to the ink incurrent pore formed at the tip of the ink supply needle 104 from the ink room 4, and ink is supplied to a recording head 102.

[0049] The enlarged drawing of the ink feed hopper 6 of an ink cartridge 2 is shown in drawing 2 . The external opening 14 is formed in the ink supply needle 104 of the recording device of the ink feed hopper 6, and the side which counters, and the internal opening 16 is formed in the ink

room side.

[0050] The tubed packing 8 is pressed fit in the ink feed hopper 6, and the through-hole 18 which can receive the ink supply needle 104 is formed in the core. Moreover, heights 20 are formed in the periphery section of the tubed packing 8, these heights 20 engage with the crevice 22 formed in the side attachment wall of the ink feed hopper 6, and the tubed packing 8 is fixed in the ink feed hopper 6. the heights 20 of this tubed packing 8, and the crevice 22 formed in the ink feed hopper 6 -- the tubed packing 8 and the ink feed hopper 6 -- liquid -- it joined together densely and has prevented ink beginning to leak from between the periphery section of packing, and the side attachment walls of the ink feed hopper 6.

[0051] The tubed packing 8 is constituted by spring materials, such as rubber ingredients, such as silicone rubber, chloroprene rubber, isobutylene isoprene rubber, ethylene-propylene rubber, and nitrile rubber, or an elastomeric material. Moreover, in order to smooth insertion of the ink supply needle 104, the glide plane layer to which coating of silicone resin, the fluororesin, etc. was carried out if needed is formed in the field to which the ink supply needle 104 of the inner skin of the tubed packing 8 touches.

[0052] It extends in the inner circumference section of the tubed packing 8 in the shape of a taper toward the direction of an ink room from the external opening 14, and the 1st taper section 24 and the 2nd taper section 26 which guide the ink supply needle 104, and the ink supply needle 104 and the fitting section 28 of the shape of a cylinder which fits in are formed in it. Moreover, the crevice 30 in which a part of valve element mentioned later is held is formed in the front face by the side of the ink room of the tubed packing 8. Moreover, the pleat 32 of a diameter smaller than the outer diameter of an ink supply needle was formed in this crevice 30, and ink passage is given to it. this pleat 32 -- insertion of the ink supply needle 104 -- being extended -- the perimeter of the ink supply needle 104, and liquid -- it fits in densely. Moreover, the heights 34 surrounding the perimeter of a pleat 32 are formed in the front face by the side of the ink room of the tubed packing 8.

[0053] The ink induction room 36 is formed between the tubed packing 8 and the ink rooms 4 which were fixed to the ink feed hopper 6, and the valve element 10 is held here. The ink induction room 36 engages with a part of valve element 10, and has the tubed interior 38 of a proposal which guides a valve element 10 movable almost perpendicularly to the tubed packing 8. The through-hole is formed in the interior 38 of a proposal. A valve element 10 is always energized by the compression spring 12 at the tubed packing 8 side, and is closing the ink passage of the tubed packing 8 alternatively.

[0054] One example of a valve element 10 is shown in drawing 3. The valve element 10 has the valve element section 40 which \*\*\*\* on the front face by the side of the ink room of the tubed packing 8, and the guide member 42 which guides the valve element section 40 movable almost perpendicularly to the tubed packing 8 of the ink feed hopper 6 when a valve element is held in an ink induction room. The plate-like closure section 44 which closes the ink from the ink room 4 when the valve element section 40 \*\*\*\* the valve element section 40 with the tubed packing 8, It has the spring attaching part 46 holding the spring energized so that a valve element 10 may be \*\*\*\*(ed) with the tubed packing 8, and the ink passage 48 which passes the ink from the ink room 4 when the valve element section 40 is pressed by the ink supply needle 104 of a recording device and separates the tubed packing 8 and distance. Here, the ink passage 48 excises the closure section 44, and is formed. The guide member 42 has the shaft 50 connected to said valve element section 40, and the stopper 52 formed in free one end of the shaft 50. A stopper 52 is movable magnitude about the inside of the interior 38 of a proposal of the ink induction room 36,

and has a larger path than a through-hole.

[0055] The stopper 52 of return and a valve element 10 engages with the interior 38 of a proposal prepared in the ink induction room 36, and guides the valve element section 40 to drawing 2 movable almost perpendicularly to the tubed packing 8.

[0056] By the way, the ink jet type recording head 102 called the so-called piezo mold makes a pressure generating room expand mechanically with a piezoelectric transducer etc., supplies and compresses ink here, and makes an ink droplet breathe out. Since ink cannot fully be pressurized if it is in the ink cartridge used for such an ink jet type recording head 102, and air bubbles are generated in the pressure generating room of a recording head 102, it is necessary to dissolve air bubbles in ink at the time of manufacture of ink, and to make it disappear.

[0057] Therefore, in this case, after the ink room 4 has been decompressed by maximum minus 1 atmospheric-pressure (1.033kg/(square meter)) extent to atmospheric pressure in that production process, as for an ink cartridge, ink is poured in. Therefore, even if a spring 12 is in the condition that the ink room 4 was made reduced pressure, the suppression force is set up so that the condition that the valve element 10 \*\*\*\*(ed) to the tubed packing 8 can be maintained.

[0058] As for the internal opening 16 formed in the ink room side of an ink feed hopper, area is large rather than the ink induction room 36 in which the valve element 10 is held. Therefore, it is possible for passage resistance to decrease and to supply sufficient quantity of liquefied ink to an ink feed hopper. Moreover, the filter 54 is formed between the ink rooms 4 shown in this internal opening 16 and drawing 1. Therefore, even if dust etc. is mixed in the ink of the metaphor ink room 4, it is removed by the filter 54 and a recording head is not supplied. Furthermore, since a filter 54 is the same magnitude as substantially as the internal opening 16, it has the advantage that blinding cannot happen easily while passage resistance decreases.

[0059] The closure film 56 is installed in the external opening 14, the ink feed hopper 6 is sealed, it is broken through with the ink supply needle 104 at the time of wearing, and you may make it open. This closure film 56 serves to stop the tubed packing 8 to the external opening 14 of the ink feed hopper 6 while sealing the ink feed hopper 6 of the ink cartridge before use.

[0060] Next, in this example, the tubed packing 8 when equipping a recording device with a cartridge 2 and actuation of a valve element 10 are explained.

[0061] At the time of un-using [ a recording device is not equipped with the ink cartridge 2 to use ] it, as shown in drawing 2, the closure section 44 of the valve element section 40 is oppressed by the pleat 32 of the tubed packing 8, and the closure of the ink induction room 36 is carried out to it. Here, the closure of the ink induction room 36 is carried out by the heights 34 and the closure section 44 of the valve element section 40 which were formed in the perimeter of a pleat 32.

[0062] Next, if alignment of the external opening 14 of a cartridge 2 is carried out to the ink supply needle 104 and a cartridge 2 is stuffed into the cartridge attaching part 106 of a recording apparatus as shown in drawing 4 (A), the ink supply needle 104 will penetrate the closure film 56, will be guided to the 1st taper section 24 and the 2nd taper section 26, and will advance into the fitting section 28. If a cartridge 2 is furthermore pushed in, since the tip is formed in the shape of a taper, the ink supply needle 104 will intrude the tubed packing 8 smoothly. By this, as shown in drawing 4 (B), a pleat 32 extends and opens to the ink supply needle 104, and the fitting section 28 and a pleat 32 fit in elastically with the perimeter of the ink supply needle 104, and form a fluid-tight condition. The ink supply needle 104 presses the plate-like closure section 44 of a valve element 10, and a valve element 10 resists a spring 12 and it is retreated to a convention location to it by coincidence at stability.



[0063] At this time, the ink supply needle 104 is open for free passage in the ink induction room 36 through that incurrent pore, and it becomes possible to supply the ink of the ink room 4 to a recording head 102.

[0064] On the other hand, if the ink supply needle 104 retreats in case a cartridge 2 is removed from a recording apparatus, a valve element 10 follows according to the energization force of a spring 12, and when the ink supply needle 104 retreats till the critical point when the fluid-tight condition of the perimeter of the ink supply needle 104, the fitting section 28 of the tubed packing 8, and a pleat 32 is held, the closure section 44 of a valve element 10 will close the tubed packing 8. That is, if the ink supply needle 104 separates from the fitting section 28 of the tubed packing 8, it will return to the condition that the closure section 44 of the valve element section 40 was oppressed by the pleat 32, and the closure of the ink induction room 36 was mostly carried out to coincidence.

[0065] Moreover, heights 34 may not be formed in the perimeter of the pleat 32 of the tubed packing 8, but the valve element section 40 may be made to oppress all over the crevice 30 of the tubed packing 8, as shown in drawing 5 (A) and (B). If alignment of the external opening 14 of a cartridge 2 is carried out to the ink supply needle 104 also in this case and a cartridge 2 is stuffed into the cartridge attaching part of a recording apparatus, the same operation effectiveness as the example which came to have shown to drawing 5 (B) and was shown in drawing 4 (A) and 4 (B) will be done so. Furthermore, since the plane-of-composition product of the valve element section 40 and the crevice 30 of the tubed packing 8 is large, even if contaminants, such as dust, are mixing in this case, the closure can be carried out certainly.

[0066] Furthermore, as shown in drawing 6 (A) and (B), the larger taper section 58 than the taper section at the tip of the ink supply needle 104 may be formed in the front face by the side of the external opening 14 of a pleat 32 at the tubed packing 8. Furthermore, as shown in drawing 7 (A) and (B), the single taper section 60 prolonged in a pleat 32 from the external opening 14 may be formed in the tubed packing 8. If a cartridge 2 is stuffed into the cartridge attaching part 106 of a recording apparatus in these cases and the ink supply needle 104 is inserted in a pleat 32, as shown in drawing 6 (B) and drawing 7 (B), the taper sections 58 and 60 fit in with the ink supply needle 104, respectively, elastic deformation will be carried out, the perimeter of the ink supply needle 104 will be oppressed, and the closure force will be discovered so that pleat 32 field formed comparatively thinly may imitate the taper section of the ink supply needle 104.

Therefore, the same operation effectiveness as the example shown in drawing 4 (A) and 4 (B) is done so. Furthermore, since the plane-of-composition product of the valve element section 40 and the crevice 30 of the tubed packing 8 is large, even if contaminants, such as dust, are mixing in these cases, the closure can be carried out certainly. Moreover, in the example shown in drawing 7 (A) and (B), since the force in which the taper section 60 fits into the ink supply needle 104 is strong, the better closure force is discovered.

[0067] Moreover, although the tubed packing 8 shown in this example is formed by one, it may consist of two members in which the part which contacts a valve element 10, and the ink supply needle 104 and the part which fits in were formed with another object.

[0068] Moreover, if the heights 45 which turn into the closure section 44 of the valve element section 40 from the spherical-surface section are formed as shown in drawing 8, also when the posture of a valve element 10 inclines a little, the closure force can be secured, and the dependability of the closure can be raised further.

[0069] Other examples of a valve element 10 are shown in drawing 9 (A). The valve element shown in drawing 9 (A) is constituted as two-body structure of the disc-like valve element

section 40 which \*\*\*\* on the front face by the side of the ink room 4 of the tubed packing 8, and the guide member 42 which guides a valve element 10 movable almost perpendicularly to the tubed packing 8. The valve element section 40 has two or more at least three spring attaching parts 46 in the peripheral surface of the closure section 44 and its closure section 44. The guide member 42 is constituted as an one object of the shaft 50 connected to the valve element section 40, and the stopper 52 which engages with the interior 38 of a proposal of the ink induction room 36, and guides the valve element section 40 movable almost perpendicularly to the tubed packing 8. The edge of the guide member 42 is fixed to the closure section 44 of the valve element section 40, and a valve element 10 is constituted.

[0070] That is, a valve element 10 is incorporable in the ink feed hopper 6 by inserting the guide member 42 in the interior 38 of the proposal of the ink induction room 36 from the internal opening 16 side, loading the periphery of the ink induction room 36 with a spring 12 from the internal opening 16 side, attaching the valve element section 40 in the guide member 42, and fixing.

[0071] Immobilization with the valve element section 40 and the guide member 42 drills fitting hole 40a in the valve element section 40, as shown in drawing 9 (B), and insertion and where temporary immobilization is carried out, heat welding of the guide member 42 can be carried out, or it can fix it here with adhesives. Moreover, as shown in drawing 9 (C), while forming fitting hole 40b as a thread groove, a screw slot can be formed in the junction field of the shaft 50 of the guide member 42, and it can also stop by screwing.

[0072] Other examples of a valve element 10 are shown in drawing 10 . This valve element 10 also has the valve element section 40 and the guide member 42, and the guide member 42 is constituted by the shaft 50 and the stopper 52. Here, the shaft 50 and stopper 52 of the guide member 42 are really formed as an object of elastic material, such as a macromolecule, and it has the slot 62 which extends in accordance with a shaft from a stopper 52. Moreover, the valve element section 40 may also be formed by the guide member 42 and one of elastic material, such as the same macromolecule. The ink supply needle 104 contacts and the valve element section 40 is pushed up, when a recording device is equipped with an ink cartridge. Therefore, as for the valve element section 40, being formed with a flexible material is desirable so that its point of the ink supply needle 104 may not be hurt. The stopper 52 of the guide member 42 may have the shape of a taper extended to the valve element section 40 side, as shown in drawing 10 .

[0073] If according to this example a spring 12 is inserted in the periphery of the ink induction room 36 and the tip of the guide member 42 is stuffed into through-hole 38a inside [ 38 ] a proposal at the time of the assembly of an ink cartridge, it bends from the stopper 52 fang furrow 62, becomes thin, and through-hole 38a is passed, and it will be extended to a major diameter rather than the bore of a through-hole with self elasticity, and will escape, and a stop function will be demonstrated. Here, if the valve element 10 is formed by one, while being able to reduce components mark and being able to reduce activity strokes, assembly nature also improves.

[0074] In addition, in this example, although the snap hook for \*\*\*\* is formed in a valve element 10 side, even if it forms the branch which divides the interior 38 of a proposal into a hoop direction by two or more slits, and carries out expansion elastic deformation to extent which can insert the stopper 52 of a valve element, the same operation is done so.

[0075] By the way, it is necessary to form a valve element 10 small as much as possible, and it becomes that the fluid resistance of the ink passage at the time of valve opening tends to become high on the relation inserted in an ink induction room. Drawing 11 shows the example for coping with such a problem. Crevice 44a and penetration section 44b are formed in the closure section

44 of the valve element section 40 to the valve element 10 shown in drawing 9 (A). Crevice 44a had the bottom surface part of a major diameter from the pleat 32 of the tubed packing 8, and penetration section 44b followed the bottom surface part of crevice 44a, and has given ink passage. Without spoiling a clausilium function, if two or more such at least one ink passage is formed preferably, at the time of valve opening, it can be made to be able to go also via crevice 44a and penetration section 44b, and ink can be discharged by little passage resistance to the tubed packing 8 side.

[0076] Moreover, as shown in drawing 12, when a valve element 10 is pressed with the ink supply needle 104 by the wall surface which forms the ink induction room 36 at the ink room 4 side, it sets in the location where the closure section 44 of the valve element section 40 is held. Even if it forms at least one articles crevice 36a formed more broadly than the thickness of the direction of an ink room of the closure section 44 Without spoiling a clausilium function like the example of above-mentioned drawing 11, at the time of valve opening, it can be made to be able to go also via crevice 36a, and ink can be discharged by little passage resistance down-stream rather than the valve element section 40. In the structure of this example, if the valve element in which crevice 44a was formed is used as shown in drawing 11, passage resistance can be lowered more certainly.

[0077] Moreover, since the closure of the ink from the ink room 4 is carried out by \*\*\*\* of a valve element 10 and the tubed packing 8, the ink cartridge 2 by this invention does not necessarily need to seal the external opening 14 further with a closure film etc. Therefore, as shown in drawing 13 (A) and 13 (B), circle-like through-hole 56a may be beforehand drilled by the closure film 56 installed in the external opening 14. As shown in drawing 14, a through-hole may be formed of slitting of \*\*\*\*\*. By doing in this way, insertion of the ink supply needle 104 becomes easy.

[0078] Furthermore, as shown in drawing 15 (A) and 15 (B), a part of external opening 14 may be made to project, and this may be used as piece of stop 14a. In this case, since piece of stop 14a is formed only by making the external opening 14 project, components mark become fewer and activity strokes are reduced.

[0079] Furthermore, as shown in drawing 16 (A) and drawing 16 (B), crevice 14b which carries out opening to the apical surface and peripheral surface of the external opening 14 is formed, and you may make it stick the closure film 56.

[0080] According to these examples, since it is no longer a closed space, even if the ink feed hopper 6 is opened for free passage by atmospheric air, and it faces the abrupt change of environmental temperature, it can prevent that it is not influenced by expansion of the air of the external opening 14, and contraction, and an unnecessary pressure acts on a valve element 10 or the tubed packing 8.

[0081] Drawing 17 (A), 17 (B), and 17 (C) show other examples of the ink cartridge concerning this invention. Here, like the example shown in drawing 2, the tubed packing 8 is installed in the ink feed hopper 6, and the valve element 10 is held. Here, the external opening 14 is formed in the ink supply needle 104 of the recording device of the ink feed hopper 6, and the side which counters, and the internal opening 16 is formed in the ink room side. Especially about the component which is not specified, it has the same operation effectiveness as the example shown in drawing 2.

[0082] The 1st taper section 24 and the 2nd taper section 26 to which it shows the ink supply needle 104, and the ink supply needle 104 and the fitting section 28 of the shape of a cylinder which fits in are formed in the inner skin by the side of the external opening 14 of the tubed

packing 8 in order toward the ink room side from the external opening 14. Moreover, annular heights 8a projected from the fitting section 28 to the ink room 4 side was formed in the tubed packing 8, and the path has given thin ink outflow hole 18a a little to it from the fitting section 28.

[0083] On the other hand, the valve element 10 has the valve element section 40 and the guide member 42, the valve element section 40 is constituted by the closure section 44 and the spring attaching part 46, and the guide member 42 is constituted by the shaft 50 and the stopper 52. The valve element section 40 has projection 45b further in the tubed packing 8 of the closure section 44, and the field which \*\*\*\*. This projection 45b is the magnitude which can intrude ink outflow hole 18a of the tubed packing 8. Thus, the constituted valve element 10 fits loosely into the interior 38 of the proposal of the ink induction room 36, and becomes movable almost perpendicularly to the tubed packing 8.

[0084] this projection 45b was shown in drawing 17 (B) -- as -- the taper-like ink supply needle 104 -- the tubed packing 8 and liquid -- it is chosen as the height which contacts at the tip of the ink supply needle 104 at the same time it fits in densely. thus -- if it carries out -- the ink supply needle 104 -- the tubed packing 8 and liquid -- since a valve element 10 is pressed by the ink supply needle 104 and opens while becoming dense, ink is supplied to an ink supply needle, without air and air bubbles entering in the ink feed hopper 6 and the ink supply needle 104.

[0085] When according to this example the taper-like ink supply needle 104 fits in with the tubed packing 8 and a fluid-tight condition is secured in the process in which a recording device is equipped with an ink cartridge 2, that tip contacts projection 45b of the closure section 44.

[0086] If an ink cartridge 2 is further pushed in in this condition, it will be in the condition that it can intrude while the ink supply needle 104 resists elasticity, extends the fitting section 34 of the tubed packing 8, and ink outflow hole 18a and pushes aside air to an ink room side, and ink can be supplied to a recording head 102. Thus, if the ink supply needle 104 will be in the tubed packing 8 and a fluid-tight condition and advances, in order that a valve element 10 may separate from the tubed packing 8, it is prevented that the air compressed with the ink supply needle 104 infiltrates into the ink supply needle 104.

[0087] On the other hand, if drawn out that ink cartridges should be exchanged, the valve element 10 energized by the spring 12 by retreat of the ink supply needle 104 follows. Thus, if the ink supply needle 104 retreats further, projection 45b of the closure section 44 of a valve element 10 will advance into ink outflow hole 18a. The closure section 44 \*\*\*\* to annular heights 8a at the moment of the ink supply needle 104 retreating furthermore and separating with the tubed packing 8 ( drawing 17 (B)), passage with the ink induction room 36 is severed, and the outflow of the ink from the external opening 14 and invasion of air or air bubbles are prevented.

[0088] Drawing 18 (A), 18 (B), and 18 (C) show other examples of the ink cartridge concerning this invention. In this example, like the ink cartridge shown in drawing 17 (A) -17(C), the tubed packing 8 forms ink outflow hole 18a and annular heights 8a which encloses ink outflow hole 18a, and is constituted.

[0089] On the other hand, the valve element 10 has the valve element section 40 and the guide member 42, the valve element section 40 is constituted by the closure section 44 and the spring attaching part 46, and the guide member 42 is constituted by the shaft 50 and the stopper 52. The spherical-surface-like heights 45 are formed in the tubed packing 8 and the field which \*\*\*\* at the closure section 44 of the valve element section 40. The spherical surface of these heights 45 is a major diameter from the path of the periphery of profile and annular heights 8a.

[0090] The enlarged drawing of the valve element 10 which has the spherical-surface-like heights 45 in drawing 19 (A) is shown. The heights 45 which make the closure section 44 of the valve element section 40 are formed as a part of spherical surface with the radius R longer than die-length L of a shaft 50, and they are constituted so that it may not be concerned with the inclination of the posture of the some of a valve element 10 but annular heights 8a may be closed certainly.

[0091] The heights 45 of the valve element section 40 at least should just be formed as a part of spherical surface with diameter 2R longer than the diameter at the maximum equator r1 at the time of cutting in respect of being level to the tubed packing 8, when the valve element section 40 is held in the ink feed hopper 6.

[0092] According to this example, when the taper-like ink supply needle 104 fits in with the tubed packing 8 and a fluid-tight condition is secured in the process in which it equips with an ink cartridge 2, the tip of ( drawing 18 (B)) and the ink supply needle 104 contacts the heights 45 of the closure section 44 of a valve element 10. if an ink cartridge 2 is further pushed in in this condition, the ink supply needle 104 will be guided to the taper section 58 -- having -- the heights 45 of a valve element 10 -- a core is contacted mostly, and it intrudes, resisting elasticity and extending ink incurrent pore 8a of the tubed packing 8 in that condition, ( drawing 18 (C)).

[0093] Thus, if the ink supply needle 104 will be in the tubed packing 8 and a fluid-tight condition and advances, in order that a valve element 10 may separate from the tubed packing 8, it is prevented that the air compressed with the ink supply needle 104 infiltrates into the ink supply needle 104. In this condition, the ink supply needle 104 contacts the core of the heights 45 of the shape of the spherical surface with a big curvature diameter, and since the inclination is regulated with the shaft 50, the valve element 10 whole is certainly made a fixed location, without sliding on a valve element 10 from the ink supply needle 104.

[0094] On the other hand, if drawn out that an ink cartridge 2 should be exchanged, the valve element 10 energized by the spring 12 by retreat of the ink supply needle 104 follows. Thus, if the ink supply needle 104 retreats further, the moment heights 45 separate with the ink supply needle 104, it will \*\*\*\* to annular heights 8a ( drawing 18 (B)), and passage with the ink induction room 36 will be severed, and the outflow of the ink from the ink feed hopper 6 and invasion of air or air bubbles will be prevented. And since the spherical-surface-like heights 45 are formed in the closure side 44, even if the posture of a valve element 10 inclines a little by backlash etc., annular heights 8a can be closed certainly and leakage \*\*\*\* of ink can be prevented.

[0095] In addition, the ink supply needle 104 can be made to advance easily, expanding a touch area with the ink supply needle 104 to them, and securing a positive airtight to them, if flat-surface section 45c with a path [ a little ] smaller than the bore of ink outflow hole 18a is formed in the spherical-surface-like heights 45, as shown in drawing 19 (B) without reducing the closure force with annular heights 8a.

[0096] Furthermore, as shown in drawing 19 (C), the part equivalent to which the tip of the ink supply needle 104 is is set to flat-surface 45c, and even if it forms as 45d of chamfers from the edge of the flat-surface 45c so that a conical surface may be formed, the almost same closure force is securable.

[0097] A spring may be a hauling spring, as shown in drawing 2020 , it can put the end of the hauling spring 64 between a cartridge 2 with the tubed packing 8, can make the other end able to contact the ink room side front face of a valve element 10, and can also give the energization force for a valve element 10 toward the direction of the tubed packing 8 from an ink room side.

If it does in this way, since it is not necessary to prepare spring attaching part 46 grade in a valve element 10, and to install the interior 38 of a proposal in the ink induction room 36, structure can be simplified and production processes are reduced.

[0098] Drawing 21 and drawing 22 show other examples of a valve element. The valve element 70 has the valve element section 72 which \*\*\*\* on the front face by the side of the ink room of the tubed packing 8, and the attaching part 74 which holds the valve element section 72 so that the valve element section 72 may \*\*\*\* with the tubed packing 8. If it is formed of elastic material, such as hard rubber and a macromolecule material with a high elastic modulus, or an elastomer, the ink supply needle 104 fits in with the tubed packing 8 and the valve element section 72 of a valve element 70 is pressed, \*\*\*\* is possible for this attaching part 74 by it. The valve element section 72 may be formed with an attaching part 74 and another object, and may be formed of elastic material by the attaching part 74 and one. Since an attaching part 74 will work also as a guide member which guides the valve element section 72 perpendicularly possible [ an attitude ] substantially to the tubed packing 8 while making it \*\*\*\* the valve element section 72 on the front face by the side of the ink room of the tubed packing 8 if it does in this way, components mark are reducible.

[0099] Moreover, the valve element 70 may have the attaching part 74 of plurality (here three), as shown in drawing 21 , and as shown in drawing 22 , it may have one attaching part 74.

[0100] Drawing 23 (A) and 23 (B) show other examples of a valve element. The valve element 80 has the valve element section 82 which \*\*\*\* on the front face by the side of the ink room of the tubed packing 8, and the elastic member 84 made to \*\*\*\* the valve element section 82 to the tubed packing 8. An elastic member is a member of rubber etc. which can be expanded and contracted here. In the example shown in drawing 23 (A), the valve element section 82 is alternatively \*\*\*\*(ed) by the tubed packing 8 by the elastic member 84 connected with the crevice 30 formed in the front face by the side of the ink room of the tubed packing 8. As shown in drawing 23 (B), the valve element section 82 is pressed by penetration of the ink supply needle 104 of a recording device in the direction of an ink room. For this reason, the closure of a valve element 80 is canceled, and the ink from an ink room flows into the incurrent pore of the ink supply needle 104, and is supplied to the recording head 102 of a recording device.

[0101] Moreover, it may be made to \*\*\*\* a valve element 80 to tubed packing by the elastic member 84, and the valve element section 82 is pressed by penetration of the ink supply needle 104 in the direction of an ink room, and it punctures the pleat of the tubed packing 8 by it while the end of the valve element section 82 is fixed to the tubed packing 8, as shown in drawing 24 (A) and 24 (B). For this reason, the ink from an ink room flows into the incurrent pore of the ink supply needle 104, and is supplied to the recording head 102 of a recording device.

[0102] In this case, a valve element 80 is formed by the tubed packing 8 and one, and that part may be made to be fixed to the tubed packing 8. If it does in this way, components mark can be reduced and routings will be reduced.

[0103] Moreover, a valve element 10 may form the cut section in the ink supply needle [ of the valve element section 40 ] 104, and front-face side contacting by pressing, as shown in drawing 25 (A) thru/or (D). Drawing 25 (A) and the cut section of (B) are cut deeply whenever [ taper section / of the ink supply needle 104 / , and isogonism ]. Moreover, drawing 25 (C) and the cut section of (D) are deeply cut so that it may become an acute angle from the taper section of the ink supply needle 104. If it does in this way, the impact to the ink supply needle 104 at the time of the ink supply needle 104 pressing a valve element 10 can be lessened. In the example especially shown in drawing 25 (C) and (D), since the tip of the ink supply needle 104 does not

touch the valve element section 40 also in case the ink supply needle 104 presses a valve element 10, its point of the ink supply needle 104 is not hurt.

[0104] Furthermore, as shown in drawing 26, the two fitting sections which fit into the perimeter of the ink supply needle 104 may be formed in the tubed packing 8. thus -- if it carries out -- the two fitting sections 28a and 28b -- in order that each may fit in with the ink supply needle 104, a fluid-tight condition with the tubed packing 8 and the ink supply needle 104 is maintained more at altitude. In this case, the two fitting sections 28a and 28b may have the pleat, respectively, or may not have it, or whichever is sufficient as them. As for fitting section 28a by the side of external opening, it is desirable not to have the pleat. Then, in the phase before the use to which a recording device is equipped with a cartridge, fitting section 28a by the side of this external opening can seal ink. If it does in this way, since it is not necessary to close the ink feed hopper 6 with a closure film etc., components mark can be reduced and routings are reduced. Furthermore, fitting section 28a is a taper-like, and also in the phase before use, since the core is formed thinly, insertion of a needle is performed easily.

[0105] Moreover, like [ in the case of joining the ink cartridge and ink supply tube in the recording apparatus which carries only a recording head in carriage, installs an ink cartridge in a box side, and supplies the ink of a cartridge to a recording head with an ink supply tube ], although the example was taken and explained to the ink cartridge carried in carriage in an above-mentioned example, even if it applies to the ink cartridge of an off carriage mold, it is clear to do the same operation so.

[0106] Furthermore, in addition to the recording device of the type using a piezoelectric transducer as an ink pressurization means of the pressure generating room of a recording head, the same operation is done so even if it applies to the recording device of the type using a heater element as an ink pressurization means.

[0107]

[Effect of the Invention] According to the first gestalt of this invention, it is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink room in which it can be open for free passage through an ink supply needle to a recording head, and a removable ink cartridge holds ink to a recording head, The ink feed hopper which has external opening and supplies ink to the recording head of a recording device from an ink room, Tubed packing which fits in with the ink supply needle of a recording device while forming the ink passage which it is installed [ passage ] in an ink feed hopper and passes ink, In order to have the valve element which is held in an ink feed hopper, \*\*\*\* with tubed packing, and closes ink passage alternatively in response to migration of an ink supply needle, At the time of the use with which closes an ink feed hopper certainly at the time of un-using [ with which a recording device is not equipped ] it, and a recording device is equipped, the ink cartridge which can open certainly with an ink supply needle can be offered, without reducing the closure force of tubed packing.

[0108] This ink cartridge can introduce the ink from an ink supply room into an ink supply needle, without air and air bubbles going into the ink interior of a room, in order that an ink supply needle may press a valve element to abbreviation coincidence and may enable supply of the ink from an ink room at it, if an ink supply needle forms tubed packing and a fluid-tight condition by penetration of the ink supply needle of a recording device.

[0109] Moreover, this ink cartridge can close the ink feed hopper of an ink cartridge, without air and air bubbles going into the ink interior of a room, in order that a valve element may close tubed packing to abbreviation coincidence if the ink supply needle of a recording device retreats

till the critical point when the ink supply needle and tubed packing of a recording device can hold a fluid-tight condition.

[0110] The porosity member which sinks in ink is held in the ink room of an ink cartridge, and the ink feed hopper of an ink cartridge can be closed, without air and air bubbles going into the ink interior of a room, in order that a valve element may close tubed packing even if it is the case where negative pressure has always occurred in an ink cartridge.

[0111] Since tubed heights are formed in the front face by the side of the ink room of tubed packing, this heights and valve element can contact, a fluid-tight condition can be formed, and an ink feed hopper can be closed.

[0112] If the tubed crevice which holds a part of valve element in the front face by the side of the ink room of tubed packing is formed, this crevice and valve element can \*\*\*\*, a fluid-tight condition can be formed, and an ink feed hopper can be closed. Moreover, since the pleat of a minor diameter is formed in the tubed crevice of tubed packing rather than this tubed crevice, fitting of an ink supply needle and tubed packing becomes possible.

[0113] Since a valve element is plate-like substantially, it is \*\*\*\*(ed) with tubed packing and forms a fluid-tight condition. Since a valve element is equipped with the valve element section which contacts the ink supply needle of a recording device, and the guide member which guides the valve element section movable almost perpendicularly to tubed packing while \*\*\*\*(ing) it on the front face by the side of the ink room of tubed packing, the valve element section is guided by the guide member and a valve element becomes perpendicularly movable to tubed packing.

[0114] Since a valve element is equipped with the valve body which contacts the ink supply needle of a recording device, and elastic members, such as a compression spring which energizes this valve body on the front face by the side of the ink room of tubed packing, while \*\*\*\*(ing) it on the front face by the side of the ink room of tubed packing, it can close an ink feed hopper certainly.

[0115] The valve body has the attaching part holding an elastic member, or the flange, and if an attaching part is a radial, since an elastic member will be held certainly, the attitude of a valve element is attained to tubed packing at stability.

[0116] Since the taper section which guides the ink supply needle of a recording device is formed in the front face by the side of external opening of tubed packing, an ink supply needle is smoothly inserted in tubed packing. Moreover, if this taper section fits into the perimeter of an ink supply needle, the fluid-tight condition of an ink supply needle and tubed packing will be formed certainly, and the closure of the ink feed hopper will be carried out. Moreover, since the fitting section which fits into the perimeter of the ink supply needle of a recording device is formed in the front face by the side of external opening of tubed packing, the fluid-tight condition of an ink supply needle and tubed packing is formed certainly.

[0117] Tubed packing is constituted by the spring material, and since the layer of a glide plane agent is formed in the field to which an ink supply needle touches at least, an ink supply needle is smoothly inserted in tubed packing.

[0118] The closure section which closes the ink from an ink room when this valve element section \*\*\*\* the valve element section with tubed packing, Since it has the ink passage which passes the ink from an ink room when the valve element section is pressed by the ink supply needle of a recording device and separates tubed packing and distance, When the valve element section \*\*\*\* to tubed packing, the closure of the ink feed hopper is carried out by the closure section, when the valve element section separates a location from tubed packing, ink passes from ink passage and ink is supplied to an ink supply needle. Since ink passage excises the closure



section and is formed, it becomes easy [ a routing ]. Since the closure section is plate-like, it \*\*\*\* with tubed packing and forms a fluid-tight condition.

[0119] Since the guide member has the shaft connected to the valve element section, and the stopper which is formed in free one end of this shaft, and guides the valve element section movable almost perpendicularly to tubed packing, a valve element becomes perpendicularly movable to tubed packing. If the shaft of a guide member is formed in the valve element section and one, it will become easy [ a routing ].

[0120] If this ink cartridge has the interior of a proposal installed in the ink feed hopper, it can engage with the stopper of a guide member and can guide the valve element section movable almost perpendicularly to tubed packing.

[0121] If the valve element section and a guide member are constituted as two-body structure and fix by the means for detachable, it will become easy like an erector. If it has the slot in accordance with the shaft from the stopper while the valve element section and a guide member are formed in one and a guide member is formed of elastic material, wearing to the interior of a proposal can be performed easily.

[0122] Since the height or the spherical-surface section is formed in the field which contacts tubed packing of the valve element section of a valve element, the closure force can be secured also when the posture of a valve element inclines a little. Since the curvature diameter of the spherical-surface section of a valve element is larger than the diameter at the maximum equator at the time of cutting the valve element section in respect of being level to tubed packing, the closure force at the time of the posture of a valve element inclining can be made more reliable. Moreover, since the curvature diameter of the spherical-surface section is large, a valve element is not stuffed into tubed packing and the closure force of tubed packing does not decline.

[0123] Since the projection which contacts at the tip of an ink supply needle is formed in the field which counters tubed packing of the valve element section of a valve element, a valve element is pressed by the ink supply needle and ink is supplied at the same time an ink supply needle forms tubed packing and a fluid-tight condition, mixing of air or air bubbles can be prevented in an ink feed hopper.

[0124] If the cut section is formed in the field which counters tubed packing of the valve element section of a valve element, the impact to an ink supply needle can be decreased and the endurance of an ink supply needle can be raised.

[0125] If the annular heights which have the through tube of a minor diameter in the front face by the side of the ink room of tubed packing rather than the periphery of the ink supply needle of a recording device are formed, the fluid-tight condition of a valve element and tubed packing will be formed certainly.

[0126] If it has the elastic holddown member which fixes flexibly to the front face by the side of the ink room of tubed packing the valve element section which contacts the ink supply needle of a recording device, and a part of valve element section and the elastic holddown member is formed by the valve element section and one while \*\*\*\*(ing) a valve element on the front face by the side of the ink room of tubed packing, components mark can be reduced and routings will be reduced.

[0127] If it has a fixed means to fix tubed packing to external opening of an ink feed hopper, tubed packing is certainly fixed to an ink feed hopper.

[0128] If it consists of the 1st fitting means to which the fitting section fits into an ink supply needle and the beginning when the ink supply needle of a recording device advances from external opening, and the 2nd fitting means which fits in with an ink supply needle when an ink

supply needle advances further, fitting of an ink supply needle and tubed packing will become more certain. Moreover, if the seal of the 1st fitting means is carried out by the initial stage, it is not necessary to prepare a closure film etc. separately, components mark can be decreased, and routings will be reduced.

[0129] According to the second gestalt of this invention, it is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink supply way where the ink distribution system which can supply the ink of the ink hold section supplies ink to a recording head from the ink hold section through a supply needle at the recording head of a recording device, The part I material which fits in with the ink supply needle of a recording device while forming the ink passage which it is installed [ passage ] in an ink supply way and passes ink, In order to have the part II material which is held in an ink supply way, \*\*\*\* with the part I material, and closes ink passage alternatively, At the time of the use with which closes ink passage certainly at the time of un-using [ with which a recording device is not equipped ] it, and a recording device is equipped, the ink distribution system which can open certainly with an ink supply needle can be offered, without reducing the closure force.

[0130] According to the third gestalt of this invention, the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through an ink supply needle to the ink supply needle with which the tip was formed in the shape of a taper, and a recording head, and a recording head is received. A removable ink cartridge, The ink room in which it \*\*\*\* and an ink cartridge holds ink, and the ink feed hopper which has external opening and supplies ink to the recording head of a recording device from an ink room through this external opening, Tubed packing which fits in with the ink supply needle of a recording device while having the ink passage which it is installed [ passage ] in an ink feed hopper and passes ink, In order to have the valve element which is held in an ink feed hopper, \*\*\*\* with tubed packing, and closes ink passage alternatively, At the time of the use with which closes an ink feed hopper certainly at the time of un-using [ with which a recording device is not equipped ] it, and a recording device is equipped, without reducing the closure force of tubed packing The recording device which has the ink cartridge which can open certainly with an ink supply needle can be offered.

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## TECHNICAL FIELD

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[Field of the Invention] the thing about the ink jet type recording device which this invention supplies ink to a recording head through the ink supply needle with which the tip was formed in the shape of a taper, and carries out the regurgitation of the ink droplet to a record medium -- it is -- especially -- said recording head -- receiving -- repeating -- attachment and detachment -- it is related with the recording device which has an usable ink cartridge and an ink distribution system.

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PRIOR ART

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[Description of the Prior Art] Generally, it connects with an ink cartridge through the ink feeder current way of a recording apparatus, and the recording head of an ink jet type recording apparatus is constituted so that supply of ink may be received from an ink cartridge. And in order to enable supply of ink, an ink feed hopper is formed in an ink cartridge, and a hollow needle is formed in an ink feeder current way, and it is constituted so that a hollow needle may be inserted in an ink feed hopper and it may be made to join together by wearing of an ink cartridge.

[0003] By the way, the recording head of the type using a piezoelectric transducer as an ink pressurization means of the pressure generating room of a recording head has weak welding pressure compared with the recording head of the type which uses a heater element as an ink pressurization means. Then, since welding pressure is increased, the ink which carried out degassing processing is held in the ink cartridge used for the recording head of the type using a piezoelectric transducer as an ink pressurization means. Therefore, also when the ink feed hopper of an ink cartridge is inserted and equipped with an ink supply needle, it is necessary to maintain the airtight condition in an ink cartridge.

[0004] Moreover, when the porosity member which sinks ink into the ink room in which ink is held within an ink cartridge is introduced, negative pressure always occurs in the ink interior of a room. Therefore, also when an ink supply needle is drawn out from the ink feed hopper of an ink cartridge, it is necessary to close so that neither air bubbles nor air may enter in an ink cartridge.

[0005] The sectional view of such an ink cartridge and an ink feeder current way is shown in drawing 27. The ink feed hopper 114 of an ink cartridge 112 is loaded with the tubed packing 120 which fits into the perimeter of the ink supply needle 118 which is open for free passage to a recording head 116 elastically. Although the ink feed hopper 114 is not illustrated, before use, the closure is carried out with a closure film etc., and ink is not beginning to leak [ come ]. And by the ink supply needle's 118 inserting at the time of use, and equipping the ink feed hopper 114 at it, a closure film is opened and ink is supplied to a recording head 116 through the ink supply needle 118.

[0006] For this reason, in the condition that ink remains in the ink cartridge, if an ink cartridge is removed from a recording device, the airtight condition of the ink cartridge currently maintained by fitting of the ink supply needle 118 and the tubed packing 120 will be canceled. Therefore, it was in the middle of use, and when the ink cartridge was removed from the recording device, ink began to leak from an ink feed hopper, and there was a possibility that air and air bubbles might invade in an ink cartridge conversely. That is, an ink cartridge was not able to be removed until it exhausted the ink in an ink cartridge.

[0007] Therefore, according to liking, a user is in the middle of use, and was not able to exchange two or more sorts of ink cartridges repeatedly.

[0008] In order to solve such a problem, for example, as shown in JP,9-174876,A, the ink cartridge whose attitude always energized to the slit the ball which prepared the slit of the septum made from an elastic body at the tip of an ink feed hopper, and was prepared in the ink cartridge inside by means of a spring, and was enabled is proposed.

[0009] Since a ball \*\*\*\*\* to a slit and the closure of the ink feed hopper is carried out while a slit is closed down when according to this a ball can be retreated, and an ink feeder current way can be opened and a hollow needle is extracted from a slit by inserting the hollow needle of a

recording apparatus in a slit, the ink from an ink cartridge begins to leak and the air into a \*\* ink cartridge and invasion of air bubbles are prevented.

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## EFFECT OF THE INVENTION

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[Effect of the Invention] According to the first gestalt of this invention, it is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink room in which it can be open for free passage through an ink supply needle to a recording head, and a removable ink cartridge holds ink to a recording head, The ink feed hopper which has external opening and supplies ink to the recording head of a recording device from an ink room, Tubed packing which fits in with the ink supply needle of a recording device while forming the ink passage which it is installed [ passage ] in an ink feed hopper and passes ink, In order to have the valve element which is held in an ink feed hopper, \*\*\*\* with tubed packing, and closes ink passage alternatively in response to migration of an ink supply needle, At the time of the use with which closes an ink feed hopper certainly at the time of un-using [ with which a recording device is not equipped ] it, and a recording device is equipped, the ink cartridge which can open certainly with an ink supply needle can be offered, without reducing the closure force of tubed packing.

[0108] This ink cartridge can introduce the ink from an ink supply room into an ink supply needle, without air and air bubbles going into the ink interior of a room, in order that an ink supply needle may press a valve element to abbreviation coincidence and may enable supply of the ink from an ink room at it, if an ink supply needle forms tubed packing and a fluid-tight condition by penetration of the ink supply needle of a recording device.

[0109] Moreover, this ink cartridge can close the ink feed hopper of an ink cartridge, without air and air bubbles going into the ink interior of a room, in order that a valve element may close tubed packing to abbreviation coincidence if the ink supply needle of a recording device retreats till the critical point when the ink supply needle and tubed packing of a recording device can hold a fluid-tight condition.

[0110] The porosity member which sinks in ink is held in the ink room of an ink cartridge, and the ink feed hopper of an ink cartridge can be closed, without air and air bubbles going into the ink interior of a room, in order that a valve element may close tubed packing even if it is the case where negative pressure has always occurred in an ink cartridge.

[0111] Since tubed heights are formed in the front face by the side of the ink room of tubed packing, this heights and valve element can contact, a fluid-tight condition can be formed, and an ink feed hopper can be closed.

[0112] If the tubed crevice which holds a part of valve element in the front face by the side of the ink room of tubed packing is formed, this crevice and valve element can \*\*\*\*, a fluid-tight condition can be formed, and an ink feed hopper can be closed. Moreover, since the pleat of a minor diameter is formed in the tubed crevice of tubed packing rather than this tubed crevice, fitting of an ink supply needle and tubed packing becomes possible.

[0113] Since a valve element is plate-like substantially, it is \*\*\*\*(ed) with tubed packing and forms a fluid-tight condition. Since a valve element is equipped with the valve element section which contacts the ink supply needle of a recording device, and the guide member which guides the valve element section movable almost perpendicularly to tubed packing while \*\*\*\*(ing) it on the front face by the side of the ink room of tubed packing, the valve element section is guided

by the guide member and a valve element becomes perpendicularly movable to tubed packing.  
[0114] Since a valve element is equipped with the valve body which contacts the ink supply needle of a recording device, and elastic members, such as a compression spring which energizes this valve body on the front face by the side of the ink room of tubed packing, while \*\*\*\*(ing) it on the front face by the side of the ink room of tubed packing, it can close an ink feed hopper certainly.

[0115] The valve body has the attaching part holding an elastic member, or the flange, and if an attaching part is a radial, since an elastic member will be held certainly, the attitude of a valve element is attained to tubed packing at stability.

[0116] Since the taper section which guides the ink supply needle of a recording device is formed in the front face by the side of external opening of tubed packing, an ink supply needle is smoothly inserted in tubed packing. Moreover, if this taper section fits into the perimeter of an ink supply needle, the fluid-tight condition of an ink supply needle and tubed packing will be formed certainly, and the closure of the ink feed hopper will be carried out. Moreover, since the fitting section which fits into the perimeter of the ink supply needle of a recording device is formed in the front face by the side of external opening of tubed packing, the fluid-tight condition of an ink supply needle and tubed packing is formed certainly.

[0117] Tubed packing is constituted by the spring material, and since the layer of a glide plane agent is formed in the field to which an ink supply needle touches at least, an ink supply needle is smoothly inserted in tubed packing.

[0118] The closure section which closes the ink from an ink room when this valve element section \*\*\*\* the valve element section with tubed packing, Since it has the ink passage which passes the ink from an ink room when the valve element section is pressed by the ink supply needle of a recording device and separates tubed packing and distance, When the valve element section \*\*\*\* to tubed packing, the closure of the ink feed hopper is carried out by the closure section, when the valve element section separates a location from tubed packing, ink passes from ink passage and ink is supplied to an ink supply needle. Since ink passage excises the closure section and is formed, it becomes easy [ a routing ]. Since the closure section is plate-like, it \*\*\*\* with tubed packing and forms a fluid-tight condition.

[0119] Since the guide member has the shaft connected to the valve element section, and the stopper which is formed in free one end of this shaft, and guides the valve element section movable almost perpendicularly to tubed packing, a valve element becomes perpendicularly movable to tubed packing. If the shaft of a guide member is formed in the valve element section and one, it will become easy [ a routing ].

[0120] If this ink cartridge has the interior of a proposal installed in the ink feed hopper, it can engage with the stopper of a guide member and can guide the valve element section movable almost perpendicularly to tubed packing.

[0121] If the valve element section and a guide member are constituted as two-body structure and fix by the means for detachable, it will become easy like an erector. If it has the slot in accordance with the shaft from the stopper while the valve element section and a guide member are formed in one and a guide member is formed of elastic material, wearing to the interior of a proposal can be performed easily.

[0122] Since the height or the spherical-surface section is formed in the field which contacts tubed packing of the valve element section of a valve element, the closure force can be secured also when the posture of a valve element inclines a little. Since the curvature diameter of the spherical-surface section of a valve element is larger than the diameter at the maximum equator

at the time of cutting the valve element section in respect of being level to tubed packing, the closure force at the time of the posture of a valve element inclining can be made more reliable. Moreover, since the curvature diameter of the spherical-surface section is large, a valve element is not stuffed into tubed packing and the closure force of tubed packing does not decline.

[0123] Since the projection which contacts at the tip of an ink supply needle is formed in the field which counters tubed packing of the valve element section of a valve element, a valve element is pressed by the ink supply needle and ink is supplied at the same time an ink supply needle forms tubed packing and a fluid-tight condition, mixing of air or air bubbles can be prevented in an ink feed hopper.

[0124] If the cut section is formed in the field which counters tubed packing of the valve element section of a valve element, the impact to an ink supply needle can be decreased and the endurance of an ink supply needle can be raised.

[0125] If the annular heights which have the through tube of a minor diameter in the front face by the side of the ink room of tubed packing rather than the periphery of the ink supply needle of a recording device are formed, the fluid-tight condition of a valve element and tubed packing will be formed certainly.

[0126] If it has the elastic holddown member which fixes flexibly to the front face by the side of the ink room of tubed packing the valve element section which contacts the ink supply needle of a recording device, and a part of valve element section and the elastic holddown member is formed by the valve element section and one while \*\*\*\*(ing) a valve element on the front face by the side of the ink room of tubed packing, components mark can be reduced and routings will be reduced.

[0127] If it has a fixed means to fix tubed packing to external opening of an ink feed hopper, tubed packing is certainly fixed to an ink feed hopper.

[0128] If it consists of the 1st fitting means to which the fitting section fits into an ink supply needle and the beginning when the ink supply needle of a recording device advances from external opening, and the 2nd fitting means which fits in with an ink supply needle when an ink supply needle advances further, fitting of an ink supply needle and tubed packing will become more certain. Moreover, if the seal of the 1st fitting means is carried out by the initial stage, it is not necessary to prepare a closure film etc. separately, components mark can be decreased, and routings will be reduced.

[0129] According to the second gestalt of this invention, it is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink supply way where the ink distribution system which can supply the ink of the ink hold section supplies ink to a recording head from the ink hold section through a supply needle at the recording head of a recording device, The part I material which fits in with the ink supply needle of a recording device while forming the ink passage which it is installed [ passage ] in an ink supply way and passes ink, In order to have the part II material which is held in an ink supply way, \*\*\*\* with the part I material, and closes ink passage alternatively, At the time of the use with which closes ink passage certainly at the time of un-using [ with which a recording device is not equipped ] it, and a recording device is equipped, the ink distribution system which can open certainly with an ink supply needle can be offered, without reducing the closure force.

[0130] According to the third gestalt of this invention, the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through an ink supply needle to the ink supply needle with which the tip was formed in the shape of a taper, and a recording head, and a recording head is received. A removable ink

cartridge, The ink room in which it \*\*\*\* and an ink cartridge holds ink, and the ink feed hopper which has external opening and supplies ink to the recording head of a recording device from an ink room through this external opening, Tubed packing which fits in with the ink supply needle of a recording device while having the ink passage which it is installed [ passage ] in an ink feed hopper and passes ink, In order to have the valve element which is held in an ink feed hopper, \*\*\*\* with tubed packing, and closes ink passage alternatively, At the time of the use with which closes an ink feed hopper certainly at the time of un-using [ with which a recording device is not equipped ] it, and a recording device is equipped, without reducing the closure force of tubed packing The recording device which has the ink cartridge which can open certainly with an ink supply needle can be offered.

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## TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, when it is going to take seal structure as shown in the ink cartridge which takes structure as shown in drawing 27 at JP,9-174876,A, there is a problem that the structure of an ink feed hopper is complicated.

[0011] On the other hand, an exhaust port is equipped with packing (rubber stopper), and the ink cartridge which held the solid sphere (ball) which is \*\*\*\*(ed) by means of a spring by the front face by the side of the ink room of packing, and retreats from the front face of packing by insertion of a tubed splicer is proposed in the ink cartridge which supplies ink to a recording head from an ink room through the splicer and packing which are open for free passage to a recording head so that JP,5-229137,A may see. The sectional view of the ink cartridge which starts drawing 28 at JP,5-229137,A is shown.

[0012] packing 134 is installed in that exhaust port 132, and this ink cartridge closes packing 134 -- as -- a solid sphere -- 136 is energized with the spring 138 in the packing 134 direction.

[0013] although the packing 134 which fits into a splicer elastically and maintains airtightness can be used as a valve seat according to this -- a valve element -- a solid sphere -- since it is constituted by 136 -- a spring 138 and a solid sphere -- there is a possibility that the physical relationship of 136 may become very unstable and it may become difficult to acquire the positive closure force. moreover, a splicer -- the tip -- a solid sphere -- a possibility of causing un-arranging is also in the desorption to the packing 134 of a splicer on the need of forming in the configuration where 136 can be held and where the cross section is large. furthermore, the packing 134 -- a solid sphere -- since 136 is pushed in, the bore of packing 134 is expanded with the passage of time, and there is also fear of the closure force over the splicer in a wearing condition declining.

[0014] It is offering the ink cartridge which can open certainly with the ink supply needle with which the tip's was formed in the shape of a taper at the time of the use with which this invention's is made in view of such a problem, and the purpose's closes an ink feed hopper certainly at the time of un-using [ with which a recording device is not equipped, without reducing the closure force of tubed packing ] it, and a recording device's is equipped.

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MEANS

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[Means for Solving the Problem] In order to solve the above-mentioned technical problem, the first gestalt of this invention It is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It is characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle.

[0016] Moreover, this ink cartridge may have the porosity member which sinks in the ink held in the ink room.

[0017] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, If said ink supply needle forms said tubed packing and fluid-tight condition by penetration of a preparation and the ink supply needle of said recording device, it will be characterized by for said ink supply needle pressing said valve element to abbreviation coincidence, and enabling supply of the ink from said ink room at it.

[0018] Moreover, if the ink supply needle of said recording device retreats till the critical point when, as for this ink cartridge, the ink supply needle and said tubed packing of said recording device can hold a fluid-tight condition, said valve element will close said tubed packing to abbreviation coincidence.

[0019] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It holds in said ink feed hopper, has the valve element which \*\*\*\* with said tubed packing and closes said ink passage alternatively in response to migration of said ink supply needle, and is characterized by forming tubed heights in the front face by the side of said ink room of said tubed packing.

[0020] The tubed crevice which holds said a part of valve element in the front face by the side of said ink room of said tubed packing may be formed.



[0021] The pleat may be formed in said tubed crevice of said tubed packing.

[0022] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It holds in said ink feed hopper, has the valve element which \*\*\*\* with said tubed packing and closes said ink passage alternatively in response to migration of said ink supply needle, and has the valve element section to which said valve element contacts said tubed packing, and this valve element section is characterized by being plate-like substantially.

[0023] In order to solve the above-mentioned technical problem, this invention is further used for the recording device which supplies ink to a recording head through an ink supply needle. The ink room in which it can be open for free passage through said ink supply needle to said recording head, and it is a removable ink cartridge and ink is held to said recording head, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room, Tubed packing which fits in with the ink supply needle of said recording device while forming the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, The valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively in response to migration of said ink supply needle, A preparation and said valve element are characterized by having the valve element section which contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the guide member which guides said valve element section movable almost perpendicularly to said tubed packing.

[0024] Said valve element may be equipped with the valve body which contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and the elastic member which energizes this valve body on the front face by the side of said ink room of said tubed packing.

[0025] Said valve body may have an attaching part holding said elastic member, or a flange, and said attaching part may be a radial.

[0026] The taper section which guides the ink supply needle of said recording device may be formed in the front face by the side of said external opening of said tubed packing. Said taper section may fit into the perimeter of said ink supply needle. The fitting section which fits into the perimeter of the ink supply needle of said recording device may be formed in the front face by the side of said external opening of said tubed packing.

[0027] Said tubed packing may be constituted by the spring material and the layer of a glide plane agent may be formed in the field to which said ink supply needle touches at least.

[0028] Said valve element section may have the closure section which closes the ink from said ink room when this valve element section \*\*\*\* with said tubed packing, and the ink passage which passes the ink from said ink room when said valve element section is pressed by the ink supply needle of said recording device and separates said tubed packing and distance. Said ink passage excises said closure section, and may be formed. Said closure section may be plate-like.

[0029] Said guide member is formed in free one end of the shaft connected to said valve element section, and this shaft, and may have the stopper which guides said valve element section movable almost perpendicularly to said tubed packing. The shaft of said guide member may be

formed in said valve element section and one.

[0030] This ink cartridge is installed in said ink feed hopper, and may be further equipped with the interior of a proposal which engages with said stopper of said guide member, and guides said valve element section movable almost perpendicularly to said tubed packing.

[0031] Said valve element section and said guide member are constituted as two-body structure, and may fix by the means for detachable. Said valve element section and said guide member may be formed in one. Said guide member of said valve element may be formed of elastic material. While said guide member of said valve element is formed of elastic material, in accordance with said shaft, you may have a slot from said stopper.

[0032] The height may be formed in the field which counters said tubed packing of the valve element section of said valve element. The projection which contacts at the tip of said ink supply needle may be formed in the field which counters said tubed packing of the valve element section of said valve element.

[0033] The cut section may be formed in the field which counters said tubed packing of the valve element section of said valve element. The aforementioned cut section of said valve element section may be formed in whenever [ taper-like part / of said ink supply needle /, and isogonism ], and may be formed in whenever [ acute-angle ] rather than the taper-like part of said ink supply needle.

[0034] The spherical-surface section may be formed in the field which contacts said tubed packing of the valve element section of said valve element.

[0035] The curvature diameter of said spherical-surface section of said valve element may be larger than the diameter at the maximum equator at the time of cutting said valve element section in respect of being level to said tubed packing.

[0036] The annular heights which have the through tube of a minor diameter in the front face by the side of said ink room of said tubed packing rather than the periphery of the ink supply needle of said recording device may be formed.

[0037] The flat-surface section of a minor diameter may be formed in the core of the spherical-surface section of said valve element rather than the through tube of said annular heights.

[0038] Said valve element may be equipped with the elastic holddown member which fixes flexibly to the front face by the side of said ink room of said tubed packing the valve element section which contacts the ink supply needle of said recording device while \*\*\*\*(ing) on the front face by the side of said ink room of said tubed packing, and said a part of valve element section. Said elastic holddown member may be formed by said valve element section and one. Said valve element may be formed by said tubed packing and one.

[0039] You may have further a fixed means to fix said tubed packing to external opening of said ink feed hopper. You may be the film in which said fixed means can insert the ink supply needle of said recording device, and the through-hole which easy-izes insertion of the ink supply needle of said recording device may be formed in the film. Furthermore, said through-hole cuts said film deeply in a cross-joint mold, and may be formed.

[0040] Said fixed means may be a piece of a stop which projects in a core side from said external opening.

[0041] Said ink feed hopper may have internal opening which carries out opening to an ink room, and may have further the filter installed in this internal opening. It is desirable that the area of said internal opening is larger than the area of the valve element section of said valve element.

[0042] You may consist of the 1st fitting means to which said fitting section fits into said ink supply needle and beginning when the ink supply needle of said recording device advances from

said external opening, and the 2nd fitting means which fits in with said ink supply needle when said ink supply needle advances further. The seal of said 1st fitting means may be carried out by the initial stage.

[0043] In order to solve the above-mentioned technical problem, the second gestalt of this invention It is used for the recording device with which a tip supplies ink to a recording head through the ink supply needle formed in the shape of a taper. The ink supply way which is the ink distribution system which can supply the ink of the ink hold section, and supplies ink to said recording head from said ink hold section through said supply needle at the recording head of said recording device, It is characterized by having the part II material which is held in said ink supply way with the ink supply needle of said recording device, and the part I material which fits in, \*\*\*\* with said part I material while forming the ink passage which it is installed [ passage ] in said ink supply way, and passes ink, and closes said ink passage alternatively.

[0044] In the condition of having fitted into extent in which said ink supply needle forms said part I material and fluid-tight condition by penetration of the ink supply needle of said recording device, said ink supply needle presses said part II material, and this ink distribution system enables supply of the ink from said ink hold section. Furthermore, when the ink supply needle of said recording device retreats till the critical point when, as for this ink distribution system, the ink supply needle and said part I material of said recording device can hold a fluid-tight condition, said part II material closes said part I material.

[0045] In order to solve the above-mentioned technical problem, the third gestalt of this invention In the recording device which is made to breathe out ink to the recording paper and is recorded A recording head, It can be open for free passage through said ink supply needle to the ink supply needle with which the tip was formed in the shape of a taper, and said recording head, and said recording head is received. A removable ink cartridge, The ink room in which it \*\*\*\* and said ink cartridge holds ink, The ink feed hopper which has external opening and supplies ink to the recording head of said recording device from said ink room through this external opening, Tubed packing which fits in with the ink supply needle of said recording device while having the ink passage which it is installed [ passage ] in said ink feed hopper, and passes ink, It is characterized by having the valve element which is held in said ink feed hopper, \*\*\*\* with said tubed packing, and closes said ink passage alternatively.

[0046]

[Embodiment of the Invention] Although this invention is hereafter explained through the gestalt of implementation of invention, not all the combination of the description of the following operation gestalten that do not limit invention concerning a claim and are explained in the operation gestalt is necessarily indispensable for the solution means of invention.

[0047] One example of the ink cartridge which starts this invention at drawing 1 is shown. The ink cartridge 2 has the ink room 4 in which ink is held, the ink room 4, and the ink feed hopper 6 open for free passage. The tubed packing 8 is installed in the ink feed hopper 6, and a valve element 10 is held between the tubed packing 8 and the ink room 4, and it is energized so that it may \*\*\*\* with the tubed packing 8 by the compression spring 12. The tubed packing 8 consists of elastic members, such as rubber and synthetic resin. The porosity member 5 which sinks in ink is held in the ink room 4. Since ink sinks into the porosity member 5, in case an ink cartridge is carried in the carriage of a recording apparatus and vibrates with a reciprocating motion, for example, ink is held fixed in the ink interior of a room. Moreover, since the porosity member 5 is held in the ink room 4, the inside of the ink room 4 is always maintained at negative pressure.

[0048] Some recording devices are shown in drawing 1 . A recording apparatus is open for free

passage with the recording head 102 fixed on the carriage which is not illustrated, and a recording head 102, and has the ink supply needle 104 with which the tip was formed in the shape of a taper, and the ink cartridge attaching part 106. An ink cartridge 2 is held at the ink cartridge attaching part 106 of a recording apparatus so that the ink feed hopper 6 may counter the ink supply needle 104 of a recording apparatus, and a recording apparatus is equipped with it when the tubed packing 8 arranged in the ink feed hopper 6 fits in with the ink supply needle 104. At this time, ink is supplied to the ink incurrent pore formed at the tip of the ink supply needle 104 from the ink room 4, and ink is supplied to a recording head 102.

[0049] The enlarged drawing of the ink feed hopper 6 of an ink cartridge 2 is shown in drawing 2. The external opening 14 is formed in the ink supply needle 104 of the recording device of the ink feed hopper 6, and the side which counters, and the internal opening 16 is formed in the ink room side.

[0050] The tubed packing 8 is pressed fit in the ink feed hopper 6, and the through-hole 18 which can receive the ink supply needle 104 is formed in the core. Moreover, heights 20 are formed in the periphery section of the tubed packing 8, these heights 20 engage with the crevice 22 formed in the side attachment wall of the ink feed hopper 6, and the tubed packing 8 is fixed in the ink feed hopper 6. the heights 20 of this tubed packing 8, and the crevice 22 formed in the ink feed hopper 6 -- the tubed packing 8 and the ink feed hopper 6 -- liquid -- it joined together densely and has prevented ink beginning to leak from between the periphery section of packing, and the side attachment walls of the ink feed hopper 6.

[0051] The tubed packing 8 is constituted by spring materials, such as rubber ingredients, such as silicone rubber, chloroprene rubber, isobutylene isoprene rubber, ethylene-propylene rubber, and nitrile rubber, or an elastomeric material. Moreover, in order to smooth insertion of the ink supply needle 104, the glide plane layer to which coating of silicone resin, the fluororesin, etc. was carried out if needed is formed in the field to which the ink supply needle 104 of the inner skin of the tubed packing 8 touches.

[0052] It extends in the inner circumference section of the tubed packing 8 in the shape of a taper toward the direction of an ink room from the external opening 14, and the 1st taper section 24 and the 2nd taper section 26 which guide the ink supply needle 104, and the ink supply needle 104 and the fitting section 28 of the shape of a cylinder which fits in are formed in it. Moreover, the crevice 30 in which a part of valve element mentioned later is held is formed in the front face by the side of the ink room of the tubed packing 8. Moreover, the pleat 32 of a diameter smaller than the outer diameter of an ink supply needle was formed in this crevice 30, and ink passage is given to it. this pleat 32 -- insertion of the ink supply needle 104 -- being extended -- the perimeter of the ink supply needle 104, and liquid -- it fits in densely. Moreover, the heights 34 surrounding the perimeter of a pleat 32 are formed in the front face by the side of the ink room of the tubed packing 8.

[0053] The ink induction room 36 is formed between the tubed packing 8 and the ink rooms 4 which were fixed to the ink feed hopper 6, and the valve element 10 is held here. The ink induction room 36 engages with a part of valve element 10, and has the tubed interior 38 of a proposal which guides a valve element 10 movable almost perpendicularly to the tubed packing 8. The through-hole is formed in the interior 38 of a proposal. A valve element 10 is always energized by the compression spring 12 at the tubed packing 8 side, and is closing the ink passage of the tubed packing 8 alternatively.

[0054] One example of a valve element 10 is shown in drawing 3. The valve element 10 has the valve element section 40 which \*\*\*\* on the front face by the side of the ink room of the tubed

packing 8, and the guide member 42 which guides the valve element section 40 movable almost perpendicularly to the tubed packing 8 of the ink feed hopper 6 when a valve element is held in an ink induction room. The plate-like closure section 44 which closes the ink from the ink room 4 when the valve element section 40 \*\*\*\* the valve element section 40 with the tubed packing 8, It has the spring attaching part 46 holding the spring energized so that a valve element 10 may be \*\*\*\*(ed) with the tubed packing 8, and the ink passage 48 which passes the ink from the ink room 4 when the valve element section 40 is pressed by the ink supply needle 104 of a recording device and separates the tubed packing 8 and distance. Here, the ink passage 48 excises the closure section 44, and is formed. The guide member 42 has the shaft 50 connected to said valve element section 40, and the stopper 52 formed in free one end of the shaft 50. A stopper 52 is movable magnitude about the inside of the interior 38 of a proposal of the ink induction room 36, and has a larger path than a through-hole.

[0055] The stopper 52 of return and a valve element 10 engages with the interior 38 of a proposal prepared in the ink induction room 36, and guides the valve element section 40 to drawing 2 movable almost perpendicularly to the tubed packing 8.

[0056] By the way, the ink jet type recording head 102 called the so-called piezo mold makes a pressure generating room expand mechanically with a piezoelectric transducer etc., supplies and compresses ink here, and makes an ink droplet breathe out. Since ink cannot fully be pressurized if it is in the ink cartridge used for such an ink jet type recording head 102, and air bubbles are generated in the pressure generating room of a recording head 102, it is necessary to dissolve air bubbles in ink at the time of manufacture of ink, and to make it disappear.

[0057] Therefore, in this case, after the ink room 4 has been decompressed by maximum minus 1 atmospheric-pressure (1.033kg/(square meter)) extent to atmospheric pressure in that production process, as for an ink cartridge, ink is poured in. Therefore, even if a spring 12 is in the condition that the ink room 4 was made reduced pressure, the suppression force is set up so that the condition that the valve element 10 \*\*\*\*(ed) to the tubed packing 8 can be maintained.

[0058] As for the internal opening 16 formed in the ink room side of an ink feed hopper, area is large rather than the ink induction room 36 in which the valve element 10 is held. Therefore, it is possible for passage resistance to decrease and to supply sufficient quantity of liquefied ink to an ink feed hopper. Moreover, the filter 54 is formed between the ink rooms 4 shown in this internal opening 16 and drawing 1 . Therefore, even if dust etc. is mixed in the ink of the metaphor ink room 4, it is removed by the filter 54 and a recording head is not supplied. Furthermore, since a filter 54 is the same magnitude as substantially as the internal opening 16, it has the advantage that blinding cannot happen easily while passage resistance decreases.

[0059] The closure film 56 is installed in the external opening 14, the ink feed hopper 6 is sealed, it is broken through with the ink supply needle 104 at the time of wearing, and you may make it open. This closure film 56 serves to stop the tubed packing 8 to the external opening 14 of the ink feed hopper 6 while sealing the ink feed hopper 6 of the ink cartridge before use.

[0060] Next, in this example, the tubed packing 8 when equipping a recording device with a cartridge 2 and actuation of a valve element 10 are explained.

[0061] At the time of un-using [ a recording device is not equipped with the ink cartridge 2 to use ] it, as shown in drawing 2 , the closure section 44 of the valve element section 40 is oppressed by the pleat 32 of the tubed packing 8, and the closure of the ink induction room 36 is carried out to it. Here, the closure of the ink induction room 36 is carried out by the heights 34 and the closure section 44 of the valve element section 40 which were formed in the perimeter of a pleat 32.

[0062] Next, if alignment of the external opening 14 of a cartridge 2 is carried out to the ink supply needle 104 and a cartridge 2 is stuffed into the cartridge attaching part 106 of a recording apparatus as shown in drawing 4 (A), the ink supply needle 104 will penetrate the closure film 56, will be guided to the 1st taper section 24 and the 2nd taper section 26, and will advance into the fitting section 28. If a cartridge 2 is furthermore pushed in, since the tip is formed in the shape of a taper, the ink supply needle 104 will intrude the tubed packing 8 smoothly. By this, as shown in drawing 4 (B), a pleat 32 extends and opens to the ink supply needle 104, and the fitting section 28 and a pleat 32 fit in elastically with the perimeter of the ink supply needle 104, and form a fluid-tight condition. The ink supply needle 104 presses the plate-like closure section 44 of a valve element 10, and a valve element 10 resists a spring 12 and it is retreated to a convention location to it by coincidence at stability.

[0063] At this time, the ink supply needle 104 is open for free passage in the ink induction room 36 through that incurrent pore, and it becomes possible to supply the ink of the ink room 4 to a recording head 102.

[0064] On the other hand, if the ink supply needle 104 retreats in case a cartridge 2 is removed from a recording apparatus, a valve element 10 follows according to the energization force of a spring 12, and when the ink supply needle 104 retreats till the critical point when the fluid-tight condition of the perimeter of the ink supply needle 104, the fitting section 28 of the tubed packing 8, and a pleat 32 is held, the closure section 44 of a valve element 10 will close the tubed packing 8. That is, if the ink supply needle 104 separates from the fitting section 28 of the tubed packing 8, it will return to the condition that the closure section 44 of the valve element section 40 was oppressed by the pleat 32, and the closure of the ink induction room 36 was mostly carried out to coincidence.

[0065] Moreover, heights 34 may not be formed in the perimeter of the pleat 32 of the tubed packing 8, but the valve element section 40 may be made to oppress all over the crevice 30 of the tubed packing 8, as shown in drawing 5 (A) and (B). If alignment of the external opening 14 of a cartridge 2 is carried out to the ink supply needle 104 also in this case and a cartridge 2 is stuffed into the cartridge attaching part of a recording apparatus, the same operation effectiveness as the example which came to have shown to drawing 5 (B) and was shown in drawing 4 (A) and 4 (B) will be done so. Furthermore, since the plane-of-composition product of the valve element section 40 and the crevice 30 of the tubed packing 8 is large, even if contaminants, such as dust, are mixing in this case, the closure can be carried out certainly.

[0066] Furthermore, as shown in drawing 6 (A) and (B), the larger taper section 58 than the taper section at the tip of the ink supply needle 104 may be formed in the front face by the side of the external opening 14 of a pleat 32 at the tubed packing 8. Furthermore, as shown in drawing 7 (A) and (B), the single taper section 60 prolonged in a pleat 32 from the external opening 14 may be formed in the tubed packing 8. If a cartridge 2 is stuffed into the cartridge attaching part 106 of a recording apparatus in these cases and the ink supply needle 104 is inserted in a pleat 32, as shown in drawing 6 (B) and drawing 7 (B), the taper sections 58 and 60 fit in with the ink supply needle 104, respectively, elastic deformation will be carried out, the perimeter of the ink supply needle 104 will be oppressed, and the closure force will be discovered so that pleat 32 field formed comparatively thinly may imitate the taper section of the ink supply needle 104.

Therefore, the same operation effectiveness as the example shown in drawing 4 (A) and 4 (B) is done so. Furthermore, since the plane-of-composition product of the valve element section 40 and the crevice 30 of the tubed packing 8 is large, even if contaminants, such as dust, are mixing in these cases, the closure can be carried out certainly. Moreover, in the example shown in

drawing 7 (A) and (B), since the force in which the taper section 60 fits into the ink supply needle 104 is strong, the better closure force is discovered.

[0067] Moreover, although the tubed packing 8 shown in this example is formed by one, it may consist of two members in which the part which contacts a valve element 10, and the ink supply needle 104 and the part which fits in were formed with another object.

[0068] Moreover, if the heights 45 which turn into the closure section 44 of the valve element section 40 from the spherical-surface section are formed as shown in drawing 8, also when the posture of a valve element 10 inclines a little, the closure force can be secured, and the dependability of the closure can be raised further.

[0069] Other examples of a valve element 10 are shown in drawing 9 (A). The valve element shown in drawing 9 (A) is constituted as two-body structure of the disc-like valve element section 40 which \*\*\*\* on the front face by the side of the ink room 4 of the tubed packing 8, and the guide member 42 which guides a valve element 10 movable almost perpendicularly to the tubed packing 8. The valve element section 40 has two or more at least three spring attaching parts 46 in the peripheral surface of the closure section 44 and its closure section 44. The guide member 42 is constituted as an one object of the shaft 50 connected to the valve element section 40, and the stopper 52 which engages with the interior 38 of a proposal of the ink induction room 36, and guides the valve element section 40 movable almost perpendicularly to the tubed packing 8. The edge of the guide member 42 is fixed to the closure section 44 of the valve element section 40, and a valve element 10 is constituted.

[0070] That is, a valve element 10 is incorporable in the ink feed hopper 6 by inserting the guide member 42 in the interior 38 of the proposal of the ink induction room 36 from the internal opening 16 side, loading the periphery of the ink induction room 36 with a spring 12 from the internal opening 16 side, attaching the valve element section 40 in the guide member 42, and fixing.

[0071] Immobilization with the valve element section 40 and the guide member 42 drills fitting hole 40a in the valve element section 40, as shown in drawing 9 (B), and insertion and where temporary immobilization is carried out, heat welding of the guide member 42 can be carried out, or it can fix it here with adhesives. Moreover, as shown in drawing 9 (C), while forming fitting hole 40b as a thread groove, a screw slot can be formed in the junction field of the shaft 50 of the guide member 42, and it can also stop by screwing.

[0072] Other examples of a valve element 10 are shown in drawing 10. This valve element 10 also has the valve element section 40 and the guide member 42, and the guide member 42 is constituted by the shaft 50 and the stopper 52. Here, the shaft 50 and stopper 52 of the guide member 42 are really formed as an object of elastic material, such as a macromolecule, and it has the slot 62 which extends in accordance with a shaft from a stopper 52. Moreover, the valve element section 40 may also be formed by the guide member 42 and one of elastic material, such as the same macromolecule. The ink supply needle 104 contacts and the valve element section 40 is pushed up, when a recording device is equipped with an ink cartridge. Therefore, as for the valve element section 40, being formed with a flexible material is desirable so that its point of the ink supply needle 104 may not be hurt. The stopper 52 of the guide member 42 may have the shape of a taper extended to the valve element section 40 side, as shown in drawing 10.

[0073] If according to this example a spring 12 is inserted in the periphery of the ink induction room 36 and the tip of the guide member 42 is stuffed into through-hole 38a inside [ 38 ] a proposal at the time of the assembly of an ink cartridge, it bends from the stopper 52 fang furrow 62, becomes thin, and through-hole 38a is passed, and it will be extended to a major diameter

rather than the bore of a through-hole with self elasticity, and will escape, and a stop function will be demonstrated. Here, if the valve element 10 is formed by one, while being able to reduce components mark and being able to reduce activity strokes, assembly nature also improves.

[0074] In addition, in this example, although the snap hook for \*\*\*\* is formed in a valve element 10 side, even if it forms the branch which divides the interior 38 of a proposal into a hoop direction by two or more slits, and carries out expansion elastic deformation to extent which can insert the stopper 52 of a valve element, the same operation is done so.

[0075] By the way, it is necessary to form a valve element 10 small as much as possible, and it becomes that the fluid resistance of the ink passage at the time of valve opening tends to become high on the relation inserted in an ink induction room. Drawing 11 shows the example for coping with such a problem. Crevice 44a and penetration section 44b are formed in the closure section 44 of the valve element section 40 to the valve element 10 shown in drawing 9 (A). Crevice 44a had the bottom surface part of a major diameter from the pleat 32 of the tubed packing 8, and penetration section 44b followed the bottom surface part of crevice 44a, and has given ink passage. Without spoiling a clausilium function, if two or more such at least one ink passage is formed preferably, at the time of valve opening, it can be made to be able to go also via crevice 44a and penetration section 44b, and ink can be discharged by little passage resistance to the tubed packing 8 side.

[0076] Moreover, as shown in drawing 12, when a valve element 10 is pressed with the ink supply needle 104 by the wall surface which forms the ink induction room 36 at the ink room 4 side, it sets in the location where the closure section 44 of the valve element section 40 is held. Even if it forms at least one articles crevice 36a formed more broadly than the thickness of the direction of an ink room of the closure section 44 Without spoiling a clausilium function like the example of above-mentioned drawing 11, at the time of valve opening, it can be made to be able to go also via crevice 36a, and ink can be discharged by little passage resistance down-stream rather than the valve element section 40. In the structure of this example, if the valve element in which crevice 44a was formed is used as shown in drawing 11, passage resistance can be lowered more certainly.

[0077] Moreover, since the closure of the ink from the ink room 4 is carried out by \*\*\*\* of a valve element 10 and the tubed packing 8, the ink cartridge 2 by this invention does not necessarily need to seal the external opening 14 further with a closure film etc. Therefore, as shown in drawing 13 (A) and 13 (B), circle-like through-hole 56a may be beforehand drilled by the closure film 56 installed in the external opening 14. As shown in drawing 14 14, a through-hole may be formed of slitting of \*\*\*\*\* . By doing in this way, insertion of the ink supply needle 104 becomes easy.

[0078] Furthermore, as shown in drawing 15 (A) and 15 (B), a part of external opening 14 may be made to project, and this may be used as piece of stop 14a. In this case, since piece of stop 14a is formed only by making the external opening 14 project, components mark become fewer and activity strokes are reduced.

[0079] Furthermore, as shown in drawing 16 (A) and drawing 16 (B), crevice 14b which carries out opening to the apical surface and peripheral surface of the external opening 14 is formed, and you may make it stick the closure film 56.

[0080] According to these examples, since it is no longer a closed space, even if the ink feed hopper 6 is opened for free passage by atmospheric air, and it faces the abrupt change of environmental temperature, it can prevent that it is not influenced by expansion of the air of the external opening 14, and contraction, and an unnecessary pressure acts on a valve element 10 or



the tubed packing 8.

[0081] Drawing 17 (A), 17 (B), and 17 (C) show other examples of the ink cartridge concerning this invention. Here, like the example shown in drawing 2, the tubed packing 8 is installed in the ink feed hopper 6, and the valve element 10 is held. Here, the external opening 14 is formed in the ink supply needle 104 of the recording device of the ink feed hopper 6, and the side which counters, and the internal opening 16 is formed in the ink room side. Especially about the component which is not specified, it has the same operation effectiveness as the example shown in drawing 2.

[0082] The 1st taper section 24 and the 2nd taper section 26 to which it shows the ink supply needle 104, and the ink supply needle 104 and the fitting section 28 of the shape of a cylinder which fits in are formed in the inner skin by the side of the external opening 14 of the tubed packing 8 in order toward the ink room side from the external opening 14. Moreover, annular heights 8a projected from the fitting section 28 to the ink room 4 side was formed in the tubed packing 8, and the path has given thin ink outflow hole 18a a little to it from the fitting section 28.

[0083] On the other hand, the valve element 10 has the valve element section 40 and the guide member 42, the valve element section 40 is constituted by the closure section 44 and the spring attaching part 46, and the guide member 42 is constituted by the shaft 50 and the stopper 52. The valve element section 40 has projection 45b further in the tubed packing 8 of the closure section 44, and the field which \*\*\*\*. This projection 45b is the magnitude which can intrude ink outflow hole 18a of the tubed packing 8. Thus, the constituted valve element 10 fits loosely into the interior 38 of the proposal of the ink induction room 36, and becomes movable almost perpendicularly to the tubed packing 8.

[0084] this projection 45b was shown in drawing 17 (B) -- as -- the taper-like ink supply needle 104 -- the tubed packing 8 and liquid -- it is chosen as the height which contacts at the tip of the ink supply needle 104 at the same time it fits in densely. thus -- if it carries out -- the ink supply needle 104 -- the tubed packing 8 and liquid -- since a valve element 10 is pressed by the ink supply needle 104 and opens while becoming dense, ink is supplied to an ink supply needle, without air and air bubbles entering in the ink feed hopper 6 and the ink supply needle 104.

[0085] When according to this example the taper-like ink supply needle 104 fits in with the tubed packing 8 and a fluid-tight condition is secured in the process in which a recording device is equipped with an ink cartridge 2, that tip contacts projection 45b of the closure section 44.

[0086] If an ink cartridge 2 is further pushed in in this condition, it will be in the condition that it can intrude while the ink supply needle 104 resists elasticity, extends the fitting section 34 of the tubed packing 8, and ink outflow hole 18a and pushes aside air to an ink room side, and ink can be supplied to a recording head 102. Thus, if the ink supply needle 104 will be in the tubed packing 8 and a fluid-tight condition and advances, in order that a valve element 10 may separate from the tubed packing 8, it is prevented that the air compressed with the ink supply needle 104 infiltrates into the ink supply needle 104.

[0087] On the other hand, if drawn out that ink cartridges should be exchanged, the valve element 10 energized by the spring 12 by retreat of the ink supply needle 104 follows. Thus, if the ink supply needle 104 retreats further, projection 45b of the closure section 44 of a valve element 10 will advance into ink outflow hole 18a. The closure section 44 \*\*\*\* to annular heights 8a at the moment of the ink supply needle 104 retreating furthermore and separating with the tubed packing 8 (drawing 17 (B)), passage with the ink induction room 36 is severed, and the outflow of the ink from the external opening 14 and invasion of air or air bubbles are

prevented.

[0088] Drawing 18 (A), 18 (B), and 18 (C) show other examples of the ink cartridge concerning this invention. In this example, like the ink cartridge shown in drawing 17 (A) -17(C), the tubed packing 8 forms ink outflow hole 18a and annular heights 8a which encloses ink outflow hole 18a, and is constituted.

[0089] On the other hand, the valve element 10 has the valve element section 40 and the guide member 42, the valve element section 40 is constituted by the closure section 44 and the spring attaching part 46, and the guide member 42 is constituted by the shaft 50 and the stopper 52. The spherical-surface-like heights 45 are formed in the tubed packing 8 and the field which \*\*\*\* at the closure section 44 of the valve element section 40. The spherical surface of these heights 45 is a major diameter from the path of the periphery of profile and annular heights 8a.

[0090] The enlarged drawing of the valve element 10 which has the spherical-surface-like heights 45 in drawing 19 (A) is shown. The heights 45 which make the closure section 44 of the valve element section 40 are formed as a part of spherical surface with the radius R longer than die-length L of a shaft 50, and they are constituted so that it may not be concerned with the inclination of the posture of the some of a valve element 10 but annular heights 8a may be closed certainly.

[0091] The heights 45 of the valve element section 40 at least should just be formed as a part of spherical surface with diameter 2R longer than the diameter at the maximum equator r1 at the time of cutting in respect of being level to the tubed packing 8, when the valve element section 40 is held in the ink feed hopper 6.

[0092] According to this example, when the taper-like ink supply needle 104 fits in with the tubed packing 8 and a fluid-tight condition is secured in the process in which it equips with an ink cartridge 2, the tip of ( drawing 18 (B)) and the ink supply needle 104 contacts the heights 45 of the closure section 44 of a valve element 10. if an ink cartridge 2 is further pushed in in this condition, the ink supply needle 104 will be guided to the taper section 58 -- having -- the heights 45 of a valve element 10 -- a core is contacted mostly, and it intrudes, resisting elasticity and extending ink incurrent pore 8a of the tubed packing 8 in that condition, ( drawing 18 (C)).

[0093] Thus, if the ink supply needle 104 will be in the tubed packing 8 and a fluid-tight condition and advances, in order that a valve element 10 may separate from the tubed packing 8, it is prevented that the air compressed with the ink supply needle 104 infiltrates into the ink supply needle 104. In this condition, the ink supply needle 104 contacts the core of the heights 45 of the shape of the spherical surface with a big curvature diameter, and since the inclination is regulated with the shaft 50, the valve element 10 whole is certainly made a fixed location, without sliding on a valve element 10 from the ink supply needle 104.

[0094] On the other hand, if drawn out that an ink cartridge 2 should be exchanged, the valve element 10 energized by the spring 12 by retreat of the ink supply needle 104 follows. Thus, if the ink supply needle 104 retreats further, the moment heights 45 separate with the ink supply needle 104, it will \*\*\*\* to annular heights 8a ( drawing 18 (B)), and passage with the ink induction room 36 will be severed, and the outflow of the ink from the ink feed hopper 6 and invasion of air or air bubbles will be prevented. And since the spherical-surface-like heights 45 are formed in the closure side 44, even if the posture of a valve element 10 inclines a little by backlash etc., annular heights 8a can be closed certainly and leakage \*\*\*\* of ink can be prevented.

[0095] In addition, the ink supply needle 104 can be made to advance easily, expanding a touch area with the ink supply needle 104 to them, and securing a positive airtight to them, if flat-

surface section 45c with a path [ a little ] smaller than the bore of ink outflow hole 18a is formed in the spherical-surface-like heights 45, as shown in drawing 19 (B) without reducing the closure force with annular heights 8a.

[0096] Furthermore, as shown in drawing 19 (C), the part equivalent to which the tip of the ink supply needle 104 is set to flat-surface 45c, and even if it forms as 45d of chamfers from the edge of the flat-surface 45c so that a conical surface may be formed, the almost same closure force is securable.

[0097] A spring may be a hauling spring, as shown in drawing 20, it can put the end of the hauling spring 64 between a cartridge 2 with the tubed packing 8, can make the other end able to contact the ink room side front face of a valve element 10, and can also give the energization force for a valve element 10 toward the direction of the tubed packing 8 from an ink room side. If it does in this way, since it is not necessary to prepare spring attaching part 46 grade in a valve element 10, and to install the interior 38 of a proposal in the ink induction room 36, structure can be simplified and production processes are reduced.

[0098] Drawing 21 and drawing 22 show other examples of a valve element. The valve element 70 has the valve element section 72 which \*\*\*\* on the front face by the side of the ink room of the tubed packing 8, and the attaching part 74 which holds the valve element section 72 so that the valve element section 72 may \*\*\*\* with the tubed packing 8. If it is formed of elastic material, such as hard rubber and a macromolecule material with a high elastic modulus, or an elastomer, the ink supply needle 104 fits in with the tubed packing 8 and the valve element section 72 of a valve element 70 is pressed, \*\*\*\* is possible for this attaching part 74 by it. The valve element section 72 may be formed with an attaching part 74 and another object, and may be formed of elastic material by the attaching part 74 and one. Since an attaching part 74 will work also as a guide member which guides the valve element section 72 perpendicularly possible [ an attitude ] substantially to the tubed packing 8 while making it \*\*\*\* the valve element section 72 on the front face by the side of the ink room of the tubed packing 8 if it does in this way, components mark are reducible.

[0099] Moreover, the valve element 70 may have the attaching part 74 of plurality (here three), as shown in drawing 21, and as shown in drawing 22, it may have one attaching part 74.

[0100] Drawing 23 (A) and 23 (B) show other examples of a valve element. The valve element 80 has the valve element section 82 which \*\*\*\* on the front face by the side of the ink room of the tubed packing 8, and the elastic member 84 made to \*\*\*\* the valve element section 82 to the tubed packing 8. An elastic member is a member of rubber etc. which can be expanded and contracted here. In the example shown in drawing 23 (A), the valve element section 82 is alternatively \*\*\*\*(ed) by the tubed packing 8 by the elastic member 84 connected with the crevice 30 formed in the front face by the side of the ink room of the tubed packing 8. As shown in drawing 23 (B), the valve element section 82 is pressed by penetration of the ink supply needle 104 of a recording device in the direction of an ink room. For this reason, the closure of a valve element 80 is canceled, and the ink from an ink room flows into the incurrent pore of the ink supply needle 104, and is supplied to the recording head 102 of a recording device.

[0101] Moreover, it may be made to \*\*\*\* a valve element 80 to tubed packing by the elastic member 84, and the valve element section 82 is pressed by penetration of the ink supply needle 104 in the direction of an ink room, and it punctures the pleat of the tubed packing 8 by it while the end of the valve element section 82 is fixed to the tubed packing 8, as shown in drawing 24 (A) and 24 (B). For this reason, the ink from an ink room flows into the incurrent pore of the ink supply needle 104, and is supplied to the recording head 102 of a recording device.

[0102] In this case, a valve element 80 is formed by the tubed packing 8 and one, and that part may be made to be fixed to the tubed packing 8. If it does in this way, components mark can be reduced and routings will be reduced.

[0103] Moreover, a valve element 10 may form the cut section in the ink supply needle [ of the valve element section 40 ] 104, and front-face side contacting by pressing, as shown in drawing 25 (A) thru/or (D). Drawing 25 (A) and the cut section of (B) are cut deeply whenever [ taper section / of the ink supply needle 104 /, and isogonism ]. Moreover, drawing 25 (C) and the cut section of (D) are deeply cut so that it may become an acute angle from the taper section of the ink supply needle 104. If it does in this way, the impact to the ink supply needle 104 at the time of the ink supply needle 104 pressing a valve element 10 can be lessened. In the example especially shown in drawing 25 (C) and (D), since the tip of the ink supply needle 104 does not touch the valve element section 40 also in case the ink supply needle 104 presses a valve element 10, its point of the ink supply needle 104 is not hurt.

[0104] Furthermore, as shown in drawing 26, the two fitting sections which fit into the perimeter of the ink supply needle 104 may be formed in the tubed packing 8. thus -- if it carries out -- the two fitting sections 28a and 28b -- in order that each may fit in with the ink supply needle 104, a fluid-tight condition with the tubed packing 8 and the ink supply needle 104 is maintained more at altitude. In this case, the two fitting sections 28a and 28b may have the pleat, respectively, or may not have it, or whichever is sufficient as them. As for fitting section 28a by the side of external opening, it is desirable not to have the pleat. Then, in the phase before the use to which a recording device is equipped with a cartridge, fitting section 28a by the side of this external opening can seal ink. If it does in this way, since it is not necessary to close the ink feed hopper 6 with a closure film etc., components mark can be reduced and routings are reduced. Furthermore, fitting section 28a is a taper-like, and also in the phase before use, since the core is formed thinly, insertion of a needle is performed easily.

[0105] Moreover, like [ in the case of joining the ink cartridge and ink supply tube in the recording apparatus which carries only a recording head in carriage, installs an ink cartridge in a box side, and supplies the ink of a cartridge to a recording head with an ink supply tube ], although the example was taken and explained to the ink cartridge carried in carriage in an above-mentioned example, even if it applies to the ink cartridge of an off carriage mold, it is clear to do the same operation so.

[0106] Furthermore, in addition to the recording device of the type using a piezoelectric transducer as an ink pressurization means of the pressure generating room of a recording head, the same operation is done so even if it applies to the recording device of the type using a heater element as an ink pressurization means.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the sectional view showing one example of the ink cartridge of this invention in a recording head in the condition in which ink supply is possible.

[Drawing 2] It is the sectional view in which it is expanded and shown near [ which was shown in drawing 1 ] the ink feed hopper of an ink cartridge.

[Drawing 3] It is the perspective view showing one example of the valve element of an ink cartridge shown in drawing 2.

[Drawing 4] It is the sectional view showing the process in which the ink supply needle of a recording device is inserted in the ink cartridge shown in drawing 2 .

[Drawing 5] It is the sectional view showing other examples of the ink cartridge of this invention, and the process in which the ink supply needle of a recording device is inserted in the cartridge.

[Drawing 6] It is the sectional view showing other examples of the ink cartridge of this invention, and the process in which the ink supply needle of a recording device is inserted in the cartridge.

[Drawing 7] It is the sectional view showing other examples of the ink cartridge of this invention, and the process in which the ink supply needle of a recording device is inserted in the cartridge.

[Drawing 8] It is the sectional view showing other examples of a valve element.

[Drawing 9] It is the perspective view and sectional view showing other examples of a valve element.

[Drawing 10] It is the sectional view showing other examples of a valve element.

[Drawing 11] It is the perspective view showing other examples of a valve element.

[Drawing 12] It is the sectional view showing one example of an ink induction room.

[Drawing 13] It is the sectional view and perspective view showing one example of the tubed packing fixed means of an ink feed hopper.

[Drawing 14] It is the perspective view showing other examples of the tubed packing fixed means of an ink feed hopper.

[Drawing 15] It is the sectional view and perspective view showing other examples of the tubed packing fixed means of an ink feed hopper.

[Drawing 16] It is the sectional view and perspective view showing other examples of the tubed packing fixed means of an ink feed hopper.

[Drawing 17] It is the sectional view in which expanding near an ink feed hopper and showing other examples of the ink cartridge of this invention.

[Drawing 18] It is the sectional view in which expanding near an ink feed hopper and showing other examples of the ink cartridge of this invention.

[Drawing 19] It is the sectional view showing other examples of the valve element shown in drawing 18 .

[Drawing 20] It is the sectional view showing the ink cartridge in which the hauling spring was prepared.

[Drawing 21] It is the side elevation and perspective view showing other examples of a valve element.

[Drawing 22] It is the side elevation and perspective view showing other examples of a valve element.

[Drawing 23] It is the sectional view showing other examples of a valve element.

[Drawing 24] It is the sectional view showing other examples of a valve element.

[Drawing 25] It is the sectional view showing other examples of a valve element.

[Drawing 26] It is the sectional view showing other examples of tubed packing.

[Drawing 27] It is the sectional view showing an example of the conventional ink cartridge.

[Drawing 28] It is the sectional view showing other examples of the conventional ink cartridge.

[Description of Notations]

2 Ink Cartridge

4 Ink Room

6 Ink Feed Hopper  
8 Tubed Packing  
10 Valve Element  
12 Spring  
32 Pleat  
36 Ink Induction Room  
40 Valve Element Section  
44 Closure Section  
104 Ink Supply Needle

(19) 日本国特許庁 (J P)

## (12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2001-113723

(P2001-113723A)

(43) 公開日 平成13年4月24日 (2001.4.24)

(51) Int.Cl.<sup>7</sup>

B 4 1 J 2/175

識別記号

F I

B 4 1 J 3/04

テーマコード\* (参考)

1 0 2 Z 2 C 0 5 6

審査請求 未請求 請求項の数49 O L (全 23 頁)

(21) 出願番号 特願平11-320145

(22) 出願日 平成11年11月10日 (1999. 11. 10)

(31) 優先権主張番号 特願平10-320113

(32) 優先日 平成10年11月11日 (1998. 11. 11)

(33) 優先権主張国 日本 (J P)

(31) 優先権主張番号 特願平11-56676

(32) 優先日 平成11年3月4日 (1999. 3. 4)

(33) 優先権主張国 日本 (J P)

(31) 優先権主張番号 特願平11-228430

(32) 優先日 平成11年8月12日 (1999. 8. 12)

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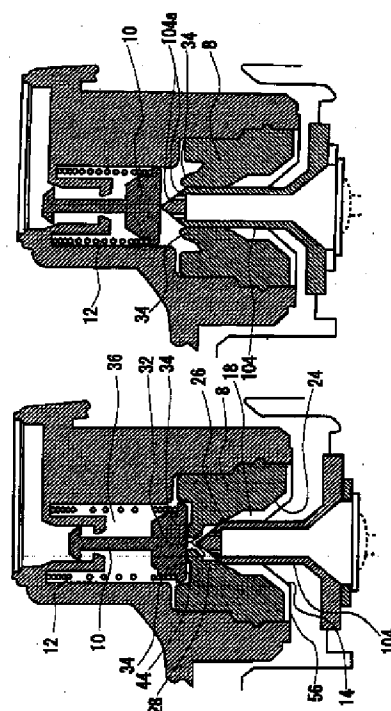
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(54) 【発明の名称】 インクジェット式記録装置及びインクカートリッジ

(57) 【要約】

【課題】 インク室から記録装置の記録ヘッドにインクを供給するインク供給口の複雑化を招くことなく、先端がテーパ状に形成されたインク供給針によってインク室からのインクの供給を可能とする。

【解決手段】 インク供給口6に、インクを通過させるインク流路を形成すると共に記録装置のインク供給針104と嵌合する筒状パッキング8と、筒状パッキング8と弾接してインク流路を選択的に封止する弁体10と、を備え、弁体10をバネ12によって筒状パッキング8に弾性させ、先端がテーパ状に形成されたインク供給針104によって弁体10を開弁する。



【特許請求の範囲】

【請求項1】 先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に收容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備えることを特徴とするインクカートリッジ。

【請求項2】 インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に收容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記記録装置のインク供給針の進入により前記インク供給針が前記筒状パッキングと液密状態を形成すると略同時に、前記インク供給針が前記弁体を押圧して前記インク室からのインクの供給を可能とすることを特徴とするインクカートリッジ。

【請求項3】 前記記録装置のインク供給針と前記筒状パッキングとが液密状態を保持できる限界点まで前記記録装置のインク供給針が後退すると略同時に、前記弁体が前記筒状パッキングを封止する請求項2に記載のインクカートリッジ。

【請求項4】 インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、インク室に收容され、インクを含浸する多孔質部材と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるイ

ンク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に收容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備えることを特徴とするインクカートリッジ。

【請求項5】 インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に收容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記筒状パッキングの前記インク室側の表面に、前記弁体と弾接する筒状凸部が形成されていることを特徴とするインクカートリッジ。

【請求項6】 前記筒状パッキングの前記インク室側の表面に前記弁体の一部を收容する筒状凹部が形成された請求項5に記載のインクカートリッジ。

【請求項7】 前記筒状パッキングの前記インク室側に壁部が形成された請求項5に記載のインクカートリッジ。

【請求項8】 インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に收容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記弁体が前記筒状パッキンと当接する弁体部を有し、該弁体部は実質的に平板状であることを特徴とするインクカートリッジ。

【請求項9】 インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、



インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記弁体が、前記筒状パッキングの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁体部と、前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドするガイド部材と、を備えることを特徴とするインクカートリッジ。

【請求項 10】 前記弁体が、前記筒状パッキングの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁本体と、該弁本体を前記筒状パッキングの前記インク室側の表面に付勢する弾性部材と、を備える請求項 1、2、4 又は 5 のいずれかに記載のインクカートリッジ。

【請求項 11】 前記弁本体が、前記弾性部材を保持する保持部を有する請求項 10 に記載のインクカートリッジ。

【請求項 12】 前記保持部が放射状である請求項 11 に記載のインクカートリッジ。

【請求項 13】 前記弁本体が、前記弾性部材を保持するフランジを有する請求項 10 に記載のインクカートリッジ。

【請求項 14】 前記筒状パッキングの前記外部開口側の表面に前記記録装置のインク供給針をガイドするテーパ部が形成された請求項 1、2、4、5、8 又は 9 のいずれかに記載のインクカートリッジ。

【請求項 15】 前記テーパ部が前記インク供給針の周囲に嵌合する請求項 14 に記載のインクカートリッジ。

【請求項 16】 前記筒状パッキングの前記外部開口側の表面に前記記録装置のインク供給針の周囲に嵌合する嵌合部が形成された請求項 1、2、4、5、8 又は 9 のいずれかに記載のインクカートリッジ。

【請求項 17】 前記筒状パッキングが弾性材料により構成され、少なくとも前記インク供給針が接する領域に滑面剤の層が形成された請求項 1、2、4、5、8 又は 9 のいずれかに記載のインクカートリッジ。

【請求項 18】 前記弁体部が、前記弁体が前記筒状パッキングと弾接するとき前記インク室からのインクを封止する封止部と、前記弁体部が前記記録装置のインク供給針に押圧されて前記筒状パッキングと距離を隔てたとき前記インク室からのインクを通過させるインク流路と、を有する請求項 9 に記載のインクカートリッジ。

【請求項 19】 前記インク流路が前記封止部を切除して形成された請求項 18 に記載のインクカートリッジ。

【請求項 20】 前記封止部が平板状である請求項 18 に記載のインクカートリッジ。

【請求項 21】 前記ガイド部材が、前記弁体部に接続された軸と、該軸の自由端側に形成され、前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドする抜止部と、を有する請求項 9 に記載のインクカートリッジ。

【請求項 22】 前記ガイド部材の軸が、前記弁体部と一体に形成される請求項 21 に記載のインクカートリッジ。

【請求項 23】 前記インク供給口に設置され、前記ガイド部材の前記抜止部と係合して前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドする案内部をさらに備える請求項 21 に記載のインクカートリッジ。

【請求項 24】 前記弁体部と前記ガイド部材とが二体構造として構成され、固着手段により固着される請求項 9 に記載のインクカートリッジ。

【請求項 25】 前記弁体部と前記ガイド部材とが一体に形成される請求項 9 に記載のインクカートリッジ。

【請求項 26】 前記弁体の前記ガイド部材が弾性材により形成される請求項 9 に記載のインクカートリッジ。

【請求項 27】 前記弁体の前記ガイド部材が弾性材により形成されると共に前記抜止部から前記軸に沿って溝を有す請求項 21 に記載のインクカートリッジ。

【請求項 28】 前記弁体の弁体部の前記筒状パッキングに対向する面に凸状部が形成された請求項 9 に記載のインクカートリッジ。

【請求項 29】 前記弁体の弁体部の前記筒状パッキングに対向する面に前記インク供給針の先端に接触する突起が形成された請求項 9 に記載のインクカートリッジ。

【請求項 30】 前記弁体の弁体部の前記筒状パッキングに対向する面に切込部が形成された請求項 8 又は 9 のいずれかに記載のインクカートリッジ。

【請求項 31】 前記インク供給針の先端がテーパ状であるとき、前記弁体部の前記切込部が、前記インク供給針のテーパ状部分と同角度に形成された請求項 30 に記載のインクカートリッジ。

【請求項 32】 前記インク供給針の先端がテーパ状であるとき、前記弁体部の前記切込部が、前記インク供給針のテーパ状部分よりも鋭角度に形成された請求項 30 に記載のインクカートリッジ。

【請求項 33】 前記弁体の弁体部の前記筒状パッキングに当接する面に、球面部が形成されている請求項 8 又は 9 のいずれかに記載のインクカートリッジ。

【請求項 34】 前記弁体の前記球面部の曲率直径が、前記弁体部を前記筒状パッキングに対して水平な面で切断した際の最大直径より大きい請求項 33 に記載のインクカートリッジ。

【請求項 35】 前記筒状パッキングの前記インク室側

の表面に、前記記録装置のインク供給針の外周よりも小径の貫通孔を持つ環状凸部が形成された請求項 8 に記載のインクカートリッジ。

【請求項 3 6】 前記弁体のインク供給針に接触する部分が平面である請求項 8 又は 1 1 のいずれかに記載のインクカートリッジ。

【請求項 3 7】 前記弁体が、前記筒状パッキンの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁体部と、前記弁体部の一部を前記筒状パッキンの前記インク室側の表面に弾力的に固定する弾性固定部材と、を備える請求項 1、2、4、又は 5 のいずれかに記載のインクカートリッジ。

【請求項 3 8】 前記筒状パッキンを前記インク供給口の外部開口に固定する固定手段をさらに有する請求項 1、2、4、5、8 又は 9 のいずれかに記載のインクカートリッジ。

【請求項 3 9】 前記固定手段が、前記記録装置のインク供給針が挿通可能なフィルムである請求項 3 8 に記載のインクカートリッジ。

【請求項 4 0】 前記記録装置のインク供給針の挿通を容易化する通孔が前記フィルムに形成されている請求項 3 9 に記載のインクカートリッジ。

【請求項 4 1】 前記通孔が前記フィルムを十字型に切り込んで形成されている請求項 4 0 に記載のインクカートリッジ。

【請求項 4 2】 前記固定手段が、前記外部開口から中心側に突出する係止片である請求項 3 8 に記載のインクカートリッジ。

【請求項 4 3】 前記嵌合部が、前記記録装置のインク供給針が前記外部開口から進入するとき、前記インク供給針と最初に嵌合する第 1 の嵌合手段と、前記インク供給針がさらに進入したとき、前記インク供給針と嵌合する第 2 の嵌合手段とからなる請求項 1 6 に記載のインクカートリッジ。

【請求項 4 4】 前記第 1 の嵌合手段が、初期段階でシールされている請求項 4 3 に記載のインクカートリッジ。

【請求項 4 5】 先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記供給針を介してインク収容部のインクを供給可能なインク供給システムであって、  
前記インク収容部から前記記録装置の記録ヘッドにインクを供給するインク供給路と、  
前記インク供給路に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する第一部材と、  
前記インク供給路に収容され、前記第一部材と弾接して前記インク流路を選択的に封止する第二部材と、  
を備えることを特徴とするインク供給システム。

【請求項 4 6】 記録紙に対してインクを吐出させて記録する記録装置において、

記録ヘッドと、

先端がテーパ状に形成されたインク供給針と、及び前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジと、を有し、

前記インクカートリッジが、

インクを収容するインク室と、

外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、

前記インク供給口に設置され、インクを通過させるインク流路を有すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、

前記インク供給口に収容され、前記筒状パッキングと弾接して前記インク流路を選択的に封止する弁体と、を備えることを特徴とする記録装置。

【請求項 4 7】 前記弁体が、前記筒状パッキンの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁本体と、該弁本体を前記筒状パッキンの前記インク室側の表面に付勢する弾性部材と、を備える請求項 4 6 に記載の記録装置。

【請求項 4 8】 記録紙に対してインクを吐出させて記録する記録装置において、

記録ヘッドと、

インク供給針と、及び前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジと、を有し、

前記インクカートリッジが、

インクを収容するインク室と、

外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、

前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、

前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、備え、

前記弁体が前記筒状パッキンと当接する弁体部を有し、該弁体部は実質的に平板状であることを特徴とする記録装置。

【請求項 4 9】 記録紙に対してインクを吐出させて記録する記録装置において、

記録ヘッドと、

インク供給針と、及び前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジと、を有し、

前記インクカートリッジが、

インクを収容するインク室と、

外部開口を有し、前記インク室から前記記録装置の記録

ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、備え、前記弁体が、前記筒状パッキングの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁体部と、前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドするガイド部材と、を備えることを特徴とする記録装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給して記録媒体にインク滴を吐出するインクジェット式記録装置に関するものであり、特に、前記記録ヘッドに対して繰り返して着脱使用可能なインクカートリッジ及びインク供給システムを有する記録装置に関する。

【0002】

【従来の技術】一般に、インクジェット式記録装置の記録ヘッドは、記録装置のインク供給流路を介してインクカートリッジに接続され、インクカートリッジからインクの供給を受けるように構成されている。そして、インクの補給を可能とするため、インクカートリッジにインク供給口を、またインク供給流路に中空針を設け、インクカートリッジの装着により中空針をインク供給口に挿入、結合させるように構成されている。

【0003】ところで、記録ヘッドの圧力発生室のインク加圧手段として圧電振動子を用いるタイプの記録ヘッドは、インク加圧手段として発熱素子を用いるタイプの記録ヘッドに比べて加圧力が弱い。そこで、加圧力を増すため、インク加圧手段として圧電振動子を用いるタイプの記録ヘッドに使用するインクカートリッジには、脱気処理をしたインクを収容する。そのため、インクカートリッジのインク供給口にインク供給針が挿入、装着された際にも、インクカートリッジ内の気密状態を維持する必要がある。

【0004】また、インクカートリッジ内でインクを収容するインク室に、インクを含浸する多孔質部材が導入されている場合は、インク室内に常時負圧が発生する。そのため、インクカートリッジのインク供給口からインク供給針が引き抜かれた場合にも、インクカートリッジ内に気泡やエアが入らないように封止する必要がある。

【0005】図27に、このようなインクカートリッジ及びインク供給流路の断面図を示す。インクカートリッジ112のインク供給口114には記録ヘッド116に連通するインク供給針118の周囲に弾性的に嵌合する筒状パッキング120が装填されている。インク供給口

114は、図示していないが、使用前には封止フィルム等で封止され、インクが漏れ出さなくなっている。そして、使用時にインク供給口114にインク供給針118が挿入、装着することによって封止フィルムが開封され、インクがインク供給針118を介して記録ヘッド116に供給される。

【0006】このため、インクカートリッジ内にインクが残っている状態で、インクカートリッジを記録装置から取り外すと、インク供給針118と筒状パッキング120との嵌合によって保たれていたインクカートリッジの気密状態が解除される。よって、使用途中でインクカートリッジを記録装置から取り外すと、インク供給口からインクが漏れ出したり、逆にインクカートリッジ内にエアや気泡が侵入するおそれがあった。つまり、インクカートリッジ内のインクを使い切ってしまうまでは、インクカートリッジを取り外すことができなかった。

【0007】そのため、ユーザーは、複数種のインクカートリッジを好みに応じて使用途中で繰返し交換することができなかった。

【0008】このような問題を解消するため、例えば特開平9-174876号公報に示されたように、インク供給口の先端に弾性体製の隔壁のスリットを設け、インクカートリッジ内側に設けたボールを常時バネでスリットに付勢して進退可能としたインクカートリッジが提案されている。

【0009】これによれば、記録装置の中空針をスリットに挿入することによりボールを後退させてインク供給流路を開くことができ、また中空針がスリットから抜かれた場合には、スリットが閉鎖すると共に、ボールがスリットへ弾接してインク供給口が封止されるため、インクカートリッジからのインクの漏れ出しやインクカートリッジ内へのエアや気泡の侵入が防止される。

【0010】

【発明が解決しようとする課題】しかし、図27に示したような構造を採るインクカートリッジに特開平9-174876号公報に示されたようなシール構造を採ろうとすると、インク供給口の構造が複雑化するという問題がある。

【0011】一方、特開平5-229137号公報に見られるように、排出口にパッキング（ゴム栓）を備え、記録ヘッドに連通する接続具とパッキングを介してインク室から記録ヘッドにインクを供給するインクカートリッジにおいて、パッキングのインク室側の表面にバネで弾接され、かつ筒状の接続具の挿入によりパッキングの表面から後退する球体（ボール）を収容したインクカートリッジが提案されている。図28に、特開平5-229137号公報に係るインクカートリッジの断面図を示す。

【0012】このインクカートリッジは、その排出口132にパッキング134が設置され、パッキング134を封止するように、球体136がパッキング134方向

にバネ１３８によって付勢されている。

【００１３】これによれば、接続具に弾性的に嵌合して気密性を維持するパッキング１３４を弁座として利用できるが、弁体が球体１３６により構成されているため、バネ１３８と球体１３６との位置関係が極めて不安定となって、確実な封止力を得ることが困難となるおそれがある。また接続具をその先端で球体１３６を保持することができる断面積の広い形状に形成する必要上、接続具のパッキング１３４への脱着に不都合をきたすおそれもある。さらに、パッキング１３４に球体１３６が押し込まれるため、時間の経過とともにパッキング１３４の内径が拡大し、装着状態で接続具に対する封止力が低下するなどのおそれもある。

【００１４】本発明は、このような問題に鑑みてなされたものであって、その目的は、筒状パッキングの封止力を低下させることなく、記録装置に装着されない非使用時にはインク供給口を確実に封止し、また記録装置に装着する使用時には、先端がテーパ状に形成されたインク供給針によって確実に開弁することができるインクカートリッジを提供することである。

【００１５】

【課題を解決するための手段】上記課題を解決するために、本発明の第一の形態は、先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備えることを特徴とする。

【００１６】また、このインクカートリッジは、インク室に収容されたインクを含浸する多孔質部材を有しているもよい。

【００１７】上記課題を解決するために、本発明は、さらに、インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選

択的に封止する弁体と、を備え、前記記録装置のインク供給針の進入により前記インク供給針が前記筒状パッキングと液密状態を形成すると略同時に、前記インク供給針が前記弁体を押圧して前記インク室からのインクの供給を可能とすることを特徴とする。

【００１８】また、このインクカートリッジは、前記記録装置のインク供給針と前記筒状パッキングとが液密状態を保持できる限界点まで前記記録装置のインク供給針が後退すると略同時に、前記弁体が前記筒状パッキングを封止する。

【００１９】上記課題を解決するために、本発明は、さらに、インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記筒状パッキングの前記インク室側の表面に筒状凸部が形成されていることを特徴とする。

【００２０】前記筒状パッキングの前記インク室側の表面に前記弁体の一部を収容する筒状凹部が形成されていてもよい。

【００２１】前記筒状パッキングの前記筒状凹部に襷部が形成されていてもよい。

【００２２】上記課題を解決するために、本発明は、さらに、インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インクを収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記弁体が前記筒状パッキングと当接する弁体部を有し、該弁体部は実質的に平板状であることを特徴とする。

【００２３】上記課題を解決するために、本発明は、さらに、インク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジであって、インク

を収容するインク室と、外部開口を有し、前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口内に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口内に収容され、前記筒状パッキングと弾接して前記インク流路を、前記インク供給針の移動に呼応して選択的に封止する弁体と、を備え、前記弁体が、前記筒状パッキングの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁体部と、前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドするガイド部材と、を備えることを特徴とする。

【0024】前記弁体は、前記筒状パッキングの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁本体と、該弁本体を前記筒状パッキングの前記インク室側の表面に付勢する弾性部材と、を備えてもよい。

【0025】前記弁本体は、前記弾性部材を保持する保持部、又はフランジを有してもよく、前記保持部が放射状であってもよい。

【0026】前記筒状パッキングの前記外部開口側の表面に前記記録装置のインク供給針をガイドするテーパ部が形成されてもよい。前記テーパ部は前記インク供給針の周囲に嵌合してもよい。前記筒状パッキングの前記外部開口側の表面に前記記録装置のインク供給針の周囲に嵌合する嵌合部が形成されてもよい。

【0027】前記筒状パッキングが弾性材料により構成され、少なくとも前記インク供給針が接する領域に滑面剤の層が形成されてもよい。

【0028】前記弁体部は、該弁体部が前記筒状パッキングと弾接するとき前記インク室からのインクを封止する封止部と、前記弁体部が前記記録装置のインク供給針に押圧されて前記筒状パッキングと距離を隔てたとき前記インク室からのインクを通過させるインク流路と、を有してもよい。前記インク流路は前記封止部を切除して形成されてもよい。前記封止部は平板状であってもよい。

【0029】前記ガイド部材は、前記弁体部に接続された軸と、該軸の自由端側に形成され、前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドする抜止部と、を有してもよい。前記ガイド部材の軸は、前記弁体部と一体に形成されてもよい。

【0030】このインクカートリッジは、前記インク供給口に設置され、前記ガイド部材の前記抜止部と係合して前記弁体部を前記筒状パッキングに対してほぼ垂直に移動可能にガイドする案内部をさらに備えてもよい。

【0031】前記弁体部と前記ガイド部材とが二体構造として構成され、固着手段により固着されてもよい。前記弁体部と前記ガイド部材とが一体に形成されてもよい。

い。前記弁体の前記ガイド部材が弾性材により形成されてもよい。前記弁体の前記ガイド部材が弾性材により形成されると共に前記抜止部から前記軸に沿って溝を有してもよい。

【0032】前記弁体の弁体部の前記筒状パッキングに対向する面に凸状部が形成されてもよい。前記弁体の弁体部の前記筒状パッキングに対向する面に前記インク供給針の先端に接触する突起が形成されてもよい。

【0033】前記弁体の弁体部の前記筒状パッキングに対向する面に切込部が形成されてもよい。前記弁体部の前記切込部は、前記インク供給針のテーパ状部分と同角度に形成されてもよく、前記インク供給針のテーパ状部分よりも鋭角度に形成されてもよい。

【0034】前記弁体の弁体部の前記筒状パッキングに当接する面に球面部が形成されてもよい。

【0035】前記弁体の前記球面部の曲率直径が、前記弁体部を前記筒状パッキングに対して水平な面で切断した際の最大直径より大きくてもよい。

【0036】前記筒状パッキングの前記インク室側の表面に、前記記録装置のインク供給針の外周よりも小径の貫通孔を持つ環状凸部が形成されてもよい。

【0037】前記弁体の球面部の中心に、前記環状凸部の貫通孔よりも小径の平面部が形成されてもよい。

【0038】前記弁体は、前記筒状パッキングの前記インク室側の表面に弾接するとともに前記記録装置のインク供給針と当接する弁体部と、前記弁体部の一部を前記筒状パッキングの前記インク室側の表面に弾力的に固定する弾性固定部材と、を備えてもよい。前記弾性固定部材が、前記弁体部と一体で形成されてもよい。前記弁体が、前記筒状パッキングと一体で形成されてもよい。

【0039】前記筒状パッキングを前記インク供給口の外部開口に固定する固定手段をさらに有してもよい。前記固定手段が、前記記録装置のインク供給針は挿通可能なフィルムであってもよく、そのフィルムには前記記録装置のインク供給針の挿通を容易化する通孔が形成されていてよい。さらに、前記通孔が前記フィルムを十字型に切り込んで形成されてもよい。

【0040】前記固定手段は、前記外部開口から中心側に突出する係止片であってもよい。

【0041】前記インク供給口が、インク室に開口する内部開口を有し、該内部開口に設置されたフィルタをさらに有してもよい。前記内部開口の面積が前記弁体の弁体部の面積より大きいことが好ましい。

【0042】前記嵌合部が、前記記録装置のインク供給針が前記外部開口から進入するとき、前記インク供給針と最初に嵌合する第1の嵌合手段と、前記インク供給針がさらに進入したとき、前記インク供給針と嵌合する第2の嵌合手段とからなってもよい。前記第1の嵌合手段が、初期段階でシールされていてよい。

【0043】上記課題を解決するために、本発明の第二

の形態は、先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、前記記録ヘッドに前記供給針を介してインク収容部のインクを供給可能なインク供給システムであって、前記インク収容部から前記記録装置の記録ヘッドにインクを供給するインク供給路と、前記インク供給路に設置され、インクを通過させるインク流路を形成すると共に前記記録装置のインク供給針と嵌合する第一部材と、前記インク供給路に収容され、前記第一部材と弾接して前記インク流路を選択的に封止する第二部材と、を備えることを特徴とする。

【0044】このインク供給システムは、前記記録装置のインク供給針の進入により前記インク供給針が前記第一部材と液密状態を形成する程度に嵌合した状態で、前記インク供給針が前記第二部材を押圧して前記インク収容部からのインクの供給を可能とする。さらにこのインク供給システムは、前記記録装置のインク供給針と前記第一部材とが液密状態を保持できる限界点まで前記記録装置のインク供給針が後退したとき、前記第二部材が前記第一部材を封止する。

【0045】上記課題を解決するために、本発明の第三の形態は、記録紙に対してインクを吐出させて記録する記録装置において、記録ヘッドと、先端がテーパ状に形成されたインク供給針と、及び前記記録ヘッドに前記インク供給針を介して連通可能であり、かつ前記記録ヘッドに対して着脱可能なインクカートリッジと、を有し、前記インクカートリッジが、インクを収容するインク室と、外部開口を有し、該外部開口を介して前記インク室から前記記録装置の記録ヘッドにインクを供給するインク供給口と、前記インク供給口に設置され、インクを通過させるインク流路を有すると共に前記記録装置のインク供給針と嵌合する筒状パッキングと、前記インク供給口に収容され、前記筒状パッキングと弾接して前記インク流路を選択的に封止する弁体と、を備えることを特徴とする。

【0046】

【発明の実施の形態】以下、発明の実施の形態を通じて本発明を説明するが、以下の実施形態は請求の範囲に係る発明を限定するものではなく、また実施形態の中で説明されている特徴の組合せの全てが発明の解決手段に必須であるとは限らない。

【0047】図1に、本発明に係るインクカートリッジの一実施例を示す。インクカートリッジ2は、インクを収容するインク室4と、インク室4と連通するインク供給口6と、を有している。インク供給口6には筒状パッキング8が設置され、筒状パッキング8とインク室4との間には弁体10が収容され、圧縮バネ12によって筒状パッキング8と弾接するよう付勢されている。筒状パッキング8は、ゴム及び合成樹脂などの弾性部材からなる。インク室4には、インクを含浸する多孔質部材5が

収容されている。インクが多孔質部材5に含浸されているので、例えばインクカートリッジが、記録装置のキャリッジに搭載されて往復運動により振動する際などにもインクが固定的にインク室内で保持される。また、インク室4内に多孔質部材5が収容されているため、インク室4内は常時負圧に保たれている。

【0048】図1には記録装置の一部が示されている。記録装置は、図示されていないキャリッジ上に固定された記録ヘッド102と、記録ヘッド102と連通し、先端がテーパ状に形成されたインク供給針104と、インクカートリッジ保持部106と、を有している。インクカートリッジ2は、インク供給口6が記録装置のインク供給針104に対向するように記録装置のインクカートリッジ保持部106に保持され、インク供給口6内に配設された筒状パッキング8がインク供給針104と嵌合することによって記録装置に装着される。このとき、インク供給針104の先端に形成されたインク流入孔にインク室4からインクが供給され、記録ヘッド102へインクが供給される。

【0049】図2に、インクカートリッジ2のインク供給口6の拡大図を示す。インク供給口6の記録装置のインク供給針104と対向する側には外部開口14が形成されており、インク室側には内部開口16が形成されている。

【0050】筒状パッキング8はインク供給口6内に圧入され、その中心部には、インク供給針104を受容可能な通孔18が形成されている。また、筒状パッキング8の外周部には凸部20が形成されており、この凸部20が、インク供給口6の側壁に形成された凹部22と係合して筒状パッキング8がインク供給口6内に固定される。この筒状パッキング8の凸部20とインク供給口6に形成された凹部22とによって、筒状パッキング8とインク供給口6とが液密に結合し、インクがパッキングの外周部とインク供給口6の側壁との間から漏れ出すことを防いでいる。

【0051】筒状パッキング8は、シリコンゴム、クロロブレンゴム、ブチルゴム、エチレン・プロピレンゴム、ニトリルゴム等のゴム材料、またはエラストマー材料等の弾性材料により構成される。また筒状パッキング8の内周面のインク供給針104が接する領域には、インク供給針104の挿入を滑らかにするために、必要に応じてシリコーン樹脂やフッ素樹脂等がコーティングされた滑面層が形成されている。

【0052】筒状パッキング8の内周部には、外部開口14からインク室の方向に向かってテーパ状に延び、インク供給針104をガイドする第1テーパ部24及び第2テーパ部26と、インク供給針104と嵌合する円筒状の嵌合部28とが形成されている。また、筒状パッキング8のインク室側の表面には後述する弁体の一部を収容する凹部30が形成されている。また、この凹部30

には、インク供給針の外径よりも小さい直径の鑿部32が形成され、インク流路を与えている。この鑿部32は、インク供給針104の挿入により拡開してインク供給針104の周囲と液密に嵌合する。また筒状パッキング8のインク室側の表面には、鑿部32の周囲を囲む凸部34が形成されている。

【0053】インク供給口6に固定された筒状パッキング8とインク室4との間にはインク誘導室36が形成され、ここに弁体10が収容されている。インク誘導室36は、弁体10の一部と係合して、弁体10を筒状パッキング8に対してほぼ垂直に移動可能にガイドする筒状の案内部38を有している。案内部38には通孔が形成されている。弁体10は圧縮バネ12により筒状パッキング8側に常時付勢され、筒状パッキング8のインク流路を選択的に封止している。

【0054】図3に、弁体10の一実施例を示す。弁体10は、筒状パッキング8のインク室側の表面に弾接する弁体部40と、弁体がインク誘導室に収容されたとき弁体部40をインク供給口6の筒状パッキング8に対してほぼ垂直に移動可能にガイドするガイド部材42と、を有している。弁体部40は、弁体部40が筒状パッキング8と弾接するときインク室4からのインクを封止する平板状の封止部44と、弁体10を筒状パッキング8と弾接するよう付勢するバネを保持するバネ保持部46と、弁体部40が記録装置のインク供給針104に押圧されて筒状パッキング8と距離を隔てたときインク室4からのインクを通過させるインク流路48と、を有す。ここで、インク流路48は、封止部44を切除して形成されている。ガイド部材42は、前記弁体部40に接続された軸50と、その軸50の自由端側に形成された抜止部52とを有す。抜止部52はインク誘導室36の案内内部38内を移動可能な大きさで、通孔よりも大きい径を有す。

【0055】図2に戻り、弁体10の抜止部52は、インク誘導室36内に設けられた案内内部38と係合して弁体部40を筒状パッキング8に対してほぼ垂直に移動可能にガイドする。

【0056】ところで、いわゆるピエゾ型と呼ばれるインクジェット式記録ヘッド102は、圧電振動子等により圧力発生室を機械的に拡大させてインクをここに補給し、また圧縮してインク滴を吐出させる。このようなインクジェット式記録ヘッド102に用いられるインクカートリッジにあっては、記録ヘッド102の圧力発生室に気泡が発生すると、インクを充分に加圧することができないため、インクの製造時に気泡をインクに溶解させて消滅させる必要がある。

【0057】そのため、この場合、インクカートリッジは、その製造工程においてインク室4が大気圧に対して最大マイナス1気圧（1.033kg/平方メートル）程度に減圧された状態でインクが注入される。よって、

バネ12は、インク室4が減圧にされた状態であっても、弁体10が筒状パッキング8に弾接した状態を保つことができるようにその弾圧力が設定されている。

【0058】インク供給口のインク室側に形成された内部開口16は、弁体10が収容されているインク誘導室36よりも面積が広がっている。そのため流路抵抗が減少し、十分な量の液状インクをインク供給口に供給することが可能である。また、この内部開口16と図1に示したインク室4との間にはフィルタ54が設けられている。よって、例えばインク室4のインクに埃などが混入していても、フィルタ54によって除去され、記録ヘッドには供給されない。さらに、フィルタ54は、内部開口16と実質的に同一の大きさなので、流路抵抗が減少すると共に目詰まりが起りにくいという利点を有す。

【0059】外部開口14には封止フィルム56を設置してインク供給口6を密封し、装着時にインク供給針104により突き破られて開封するようにしてもよい。この封止フィルム56は、使用前のインクカートリッジのインク供給口6を密封すると共に、筒状パッキング8をインク供給口6の外部開口14に係止する働きもする。

【0060】次に、この実施例において、カートリッジ2を記録装置に装着するときの筒状パッキング8と弁体10の動作について説明する。

【0061】インクカートリッジ2が記録装置に装着されていない非使用時には、図2に示したように、筒状パッキング8の鑿部32に弁体部40の封止部44が弾圧され、インク誘導室36が封止される。ここでは、インク誘導室36は、鑿部32の周囲に形成された凸部34と弁体部40の封止部44とによって封止されている。

【0062】次に、図4（A）に示したように、カートリッジ2の外部開口14をインク供給針104に位置合わせして、カートリッジ2を記録装置のカートリッジ保持部106に押し込むと、インク供給針104が封止フィルム56を貫通し、第1テーパ部24及び第2テーパ部26にガイドされて嵌合部28に進入する。さらにカートリッジ2を押し込むと、インク供給針104はその先端がテーパ状に形成されているため、筒状パッキング8にスムーズに貫入する。これにより、図4（B）に示したように鑿部32がインク供給針104に押し広げられて開き、嵌合部28と鑿部32とがインク供給針104の周囲と弾性的に嵌合して液密状態を形成する。同時に、インク供給針104は弁体10の平板状の封止部44を押圧し、弁体10はバネ12に抗して規定位置まで安定に後退させられる。

【0063】このとき、インク供給針104はその流入孔を介してインク誘導室36に連通し、インク室4のインクを記録ヘッド102に供給することが可能となる。

【0064】一方、カートリッジ2を記録装置から取り外す際にインク供給針104が後退すると、バネ12の付勢力により弁体10が追従し、インク供給針104の

周囲と筒状パッキング8の嵌合部28と襷部32との液密状態が保持される限界点までインク供給針104が後退したとき、弁体10の封止部44が筒状パッキング8を封止する。つまり、インク供給針104が筒状パッキング8の嵌合部28から外れると、ほぼ同時に、襷部32に弁体部40の封止部44が弾圧され、インク誘導室36が封止された状態に戻る。

【0065】また、図5(A)及び(B)に示したように、筒状パッキング8の襷部32の周囲に凸部34を形成せず、弁体部40を筒状パッキング8の凹部30の全面に弾圧させてもよい。この場合も、カートリッジ2の外部開口14をインク供給針104に位置合わせして、カートリッジ2を記録装置のカートリッジ保持部に押し込むと、図5(B)に示したようになり、図4(A)及び4(B)に示した例と同様の作用効果を奏する。さらに、この場合、弁体部40と筒状パッキング8の凹部30との接面積が広いので、埃などのごみが混入していても、確実に封止をすることができる。

【0066】さらに、図6(A)及び(B)に示したように、筒状パッキング8には、襷部32の外部開口14側の表面にインク供給針104の先端のテーパ部よりも大きめのテーパ部58を形成してもよい。さらに、図7(A)及び(B)に示したように、筒状パッキング8には、外部開口14から襷部32に延びる単一のテーパ部60を形成してもよい。これらの場合は、カートリッジ2を記録装置のカートリッジ保持部106に押し込み、インク供給針104が襷部32に挿入されると、図6

(B)及び図7(B)に示したように、テーパ部58及び60がそれぞれインク供給針104と嵌合し、比較的薄く形成された襷部32領域がインク供給針104のテーパ部に倣うように弾性変形してインク供給針104の周囲を弾圧して封止力を発現する。よって、図4(A)及び4(B)に示した例と同様の作用効果を奏する。さらに、これらの場合、弁体部40と筒状パッキング8の凹部30との接面積が広いので、埃などのごみが混入していても、確実に封止をすることができる。また、図7(A)及び(B)に示した例においては、テーパ部60がインク供給針104に嵌合する力が強いので、より良好な封止力を発現する。

【0067】また、本実施例に示した筒状パッキン8は、一体で形成されているが、弁体10と当接する部分と、インク供給針104と嵌合する部分とが別体で形成された2つの部材からなってもよい。

【0068】また、図8に示したように弁体部40の封止部44に球面部からなる凸部45を形成すると、弁体10の姿勢が若干傾いた際にも封止力を確保することができ、封止の信頼性をさらに高めることができる。

【0069】図9(A)に、弁体10の他の実施例を示す。図9(A)に示した弁体は、筒状パッキング8のインク室4側の表面に弾接する円盤状の弁体部40と、弁

体10を筒状パッキング8に対してほぼ垂直に移動可能にガイドするガイド部材42との2体構造として構成されている。弁体部40は、封止部44と、その封止部44の周面に複数のバネ保持部46を少なくとも3つ有している。ガイド部材42は、弁体部40に接続された軸50と、インク誘導室36の案内部38と係合して弁体部40を筒状パッキング8に対してほぼ垂直に移動可能にガイドする抜止部52との一体物として構成される。弁体10は、ガイド部材42の端部が弁体部40の封止部44に固定されて構成される。

【0070】すなわち、弁体10は、ガイド部材42を内部開口16側からインク誘導室36の案内部38に挿通し、バネ12を内部開口16側からインク誘導室36の外周に装填して弁体部40をガイド部材42に取付け固定することにより、インク供給口6内に組み込まれることができる。

【0071】弁体部40とガイド部材42との固定は、図9(B)に示したように弁体部40に嵌合孔40aを穿設し、ここにガイド部材42を挿入、仮固定した状態で熱溶着したり、接着剤により固定することができる。また図9(C)に示したように嵌合孔40bをねじ溝として形成する一方、ガイド部材42の軸50の接合領域にネジ溝を形成して螺合により止めることもできる。

【0072】図10に、弁体10の他の実施例を示す。この弁体10も弁体部40とガイド部材42とを有し、ガイド部材42は軸50と抜止部52によって構成されている。ここで、ガイド部材42の軸50と抜止部52とは高分子等の弾性材により一体物として形成されており、抜止部52から軸に沿って延びる溝62を有している。また、弁体部40も同一の高分子等の弾性材によりガイド部材42と一体で形成されてもよい。弁体部40は、インクカートリッジが記録装置に装着される時、インク供給針104が当接し、押し上げられる。そのため、インク供給針104の先端部を傷めないように、弁体部40は柔軟な素材によって形成されることが好ましい。ガイド部材42の抜止部52は、図10に示したように、弁体部40側に拡開したテーパ状であってもよい。

【0073】この実施例によれば、インクカートリッジの組立時に、インク誘導室36の外周にバネ12を挿入し、ガイド部材42の先端を案内部38の通孔38aに押し込むと、抜止部52が溝62より撓んで細くなって通孔38aを通過し、自己の弾性により通孔の内径よりも大径に拡開して抜け止め機能を発揮する。ここで、弁体10が一体で形成されていれば、部品点数を減らすことができ、作業行程が削減できると共に、組立性も向上する。

【0074】なお、この実施例においては、弁体10側に抜止用のスナップフックを形成しているが、案内部38を周方向に複数のスリットにより分割して弁体の抜止



部52の挿入が可能な程度に拡大弾性変形する枝部を形成しても同様の作用を奏する。

【0075】ところで弁体10は、インク誘導室に挿入される関係上、可及的に小型に形成する必要がある、開弁時におけるインク流路の流体抵抗が高くなりがちとなる。図11はこのような問題に対処するための実施例を示すものである。図9(A)に示した弁体10に対して、その弁体部40の封止部44には、凹部44aと貫通部44bが形成されている。凹部44aは、筒状パッキング8の襞部32より大径の底面部を有し、貫通部44bは、凹部44aの底面部に連続してインク流路を与えている。このようなインク流路を少なくとも1つ、好ましくは複数形成すると、開弁機能を損なうことなく、開弁時には、インクを凹部44a及び貫通部44bをも経由させて、筒状パッキング8側に少ない流路抵抗で排出することができる。

【0076】また、図12に示したようにインク誘導室36を形成している壁面に、弁体10がインク供給針104によりインク室4側に押圧された際に、その弁体部40の封止部44が保持される位置において、封止部44のインク室方向の厚さより幅広く形成された凹部36aを少なくとも1条形成しても、前述の図11の実施例と同様に開弁機能を損なうことなく、開弁時にインクを凹部36aをも経由させて弁体部40よりも下流に少ない流路抵抗で排出することができる。この実施例の構造において、図11に示したように凹部44aを形成した弁体を使用すると、より確実に流路抵抗を下げるができる。

【0077】また、本発明によるインクカートリッジ2は、インク室4からのインクは、弁体10と筒状パッキング8との弾接により封止されているため、必ずしも封止フィルム等によって外部開口14をさらに密封する必要はない。よって、図13(A)及び13(B)に示したように、外部開口14に設置される封止フィルム56には予め円状の通孔56aが穿設されていてもよい。図14に示したように、通孔は十字型等の切り込みによって形成されてもよい。このようにすることによって、インク供給針104の挿通が容易となる。

【0078】さらに、図15(A)及び15(B)に示したように、外部開口14の一部を突出させ、これを係止片14aとして使用してもよい。この場合、係止片14aは外部開口14を突出させるだけで形成されるので、部品点数が減り、作業行程が削減される。

【0079】さらに、図16(A)及び図16(B)に示したように外部開口14の先端面及び周面に開口する凹部14bを形成し、封止フィルム56を貼着するようにしてもよい。

【0080】これらの実施例によれば、インク供給口6が大気に連通され、閉空間ではなくなるので、環境温度の急激な変化に際しても外部開口14の空気の膨張、収

縮による影響を受けることがなく、弁体10や筒状筒状パッキング8に無用な圧力が作用するのを防止することができる。

【0081】図17(A)、17(B)及び17(C)は、本発明に係るインクカートリッジの他の実施例を示す。ここでも、図2に示した実施例と同様、インク供給口6には筒状パッキング8が設置され、弁体10が収容されている。ここでも、インク供給口6の記録装置のインク供給針104と対向する側には外部開口14が形成されており、インク室側には内部開口16が形成されている。特に明記しない構成要素については、図2に示した実施例と同様の作用効果を有する。

【0082】筒状パッキング8の外部開口14側の内周面には、外部開口14からインク室側に向かって順に、インク供給針104を案内する第1テーパ部24及び第2テーパ部26と、インク供給針104と嵌合する円筒状の嵌合部28とが形成されている。また、筒状パッキング8には、嵌合部28からインク室4側に突出した環状凸部8aが形成され、嵌合部28より若干径が細いインク流出孔18aを与えている。

【0083】一方、弁体10は、弁体部40とガイド部材42とを有しており、弁体部40は封止部44とバネ保持部46とによって構成され、ガイド部材42は軸50と抜止部52とによって構成されている。弁体部40はさらに、封止部44の筒状パッキング8と弾接する面に突起45bを有している。この突起45bは筒状パッキング8のインク流出孔18aに貫入可能な大きさである。このように構成された弁体10はインク誘導室36の案内部38に遊嵌され、筒状パッキング8に対してほぼ垂直に移動可能となる。

【0084】この突起45bは、図17(B)に示したように、テーパ状のインク供給針104が筒状パッキング8と液密に嵌合すると同時に、インク供給針104の先端に接触する高さに選択されている。このようにすると、インク供給針104が筒状パッキング8と液密になると同時に弁体10がインク供給針104に押圧されて開弁するので、インク供給口6内及びインク供給針104内にエアや気泡が入ることなくインクがインク供給針に供給される。

【0085】この実施例によれば、インクカートリッジ2を記録装置に装着する過程で、テーパ状のインク供給針104が筒状パッキング8と嵌合して液密状態を確保した時点で、その先端が封止部44の突起45bに接触する。

【0086】この状態でインクカートリッジ2がさらに押し込まれると、インク供給針104が筒状パッキング8の嵌合部34とインク流出孔18aとを弾性に抗して押し広げ、エアをインク室側に押しやりながら貫入して記録ヘッド102にインクを供給することができる状態となる。このように、インク供給針104が筒状パッキ

ング8と液密状態となって進入すると、弁体10が筒状パッキング8から離れるため、インク供給針104により圧縮されたエアがインク供給針104に浸入するのが防止される。

【0087】一方、インクカートリッジを交換すべく引き抜かれると、インク供給針104の後退によりバネ12に付勢された弁体10が追従する。このようにして、インク供給針104がさらに後退すると、弁体10の封止部44の突起45bがインク流出孔18aに進入し、さらにインク供給針104が後退して筒状パッキング8と離れる瞬間に封止部44が環状凸部8aに弾接し(図17(B))、インク誘導室36との流路が断たれて外部開口14からのインクの流出、及びエアや気泡の侵入が防止される。

【0088】図18(A)、18(B)及び18(C)は、本発明に係るインクカートリッジの他の実施例を示す。この実施例においては、図17(A)~17(C)に示したインクカートリッジと同様、筒状パッキング8は、インク流出孔18aと、インク流出孔18aを取囲む環状凸部8aとを形成して構成されている。

【0089】一方、弁体10は、弁体部40とガイド部材42とを有しており、弁体部40は封止部44とバネ保持部46とによって構成され、ガイド部材42は軸50と抜止部52とによって構成されている。弁体部40の封止部44には、筒状パッキング8と弾接する面に、球面状の凸部45が形成されている。この凸部45の球面は、大略、環状凸部8aの外周の径よりも大径である。

【0090】図19(A)に、球面状の凸部45を有する弁体10の拡大図を示す。弁体部40の封止部44をなす凸部45は、軸50の長さLよりも長い半径Rを持つ球面の一部として形成されていて、弁体10の若干の姿勢の傾きに関わらず環状凸部8aを確実に封止するように構成されている。

【0091】少なくとも、弁体部40の凸部45は、弁体部40がインク供給口6内に収容されたとき、筒状パッキング8に対して水平な面で切断した際の最大直径 $r_1$ よりも長い直径 $2R$ を有する球面の一部として形成されていればよい。

【0092】この実施例によれば、インクカートリッジ2を装着する過程で、テーパ状のインク供給針104が筒状パッキング8と嵌合して液密状態を確保した時点で(図18(B))、インク供給針104の先端が弁体10の封止部44の凸部45に接触する。この状態でインクカートリッジ2がさらに押し込まれると、インク供給針104はテーパ部58にガイドされて弁体10の凸部45のほぼ中心に当接し、その状態で筒状パッキング8のインク流入孔8aを弾性に抗して押し広げながら貫入する(図18(C))。

【0093】このように、インク供給針104が筒状パ

ッキング8と液密状態となって進入すると、弁体10が筒状パッキング8から離れるため、インク供給針104により圧縮されたエアがインク供給針104に浸入するのが防止される。この状態ではインク供給針104が曲率直径の大きな球面状の凸部45の中心に当接し、かつ弁体10全体が軸50により傾きが規制されているから、弁体10は、インク供給針104から滑ることなく、一定の位置に確実に押し上げられる。

【0094】一方、インクカートリッジ2を交換すべく引き抜かれると、インク供給針104の後退によりバネ12に付勢された弁体10が追従する。このようにして、インク供給針104がさらに後退すると、凸部45がインク供給針104と離れる瞬間に環状凸部8aに弾接し(図18(B))、インク誘導室36との流路を断ち、インク供給口6からのインクの流出、及びエアや気泡の侵入が防止される。そして、封止面44に球面状の凸部45が形成されているため、ガタ等により弁体10の姿勢が若干傾いたとしても、環状凸部8aを確実に封止することができ、インクの漏れ出しが防止できる。

【0095】なお、図19(B)に示したように、球面状の凸部45に、インク流出孔18aの内径よりも若干小さい径を持つ平面部45cを形成しておく、環状凸部8aとの封止力を低下させることなく、インク供給針104との接触面積を拡大して確実な気密を確保しつつ、インク供給針104を容易に進入させることができる。

【0096】さらには、図19(C)に示したようにインク供給針104の先端があたる部分を平面45cとし、その平面45cの端部から、円錐面を形成する様に面取り部45dとして形成しても、ほぼ同様の封止力を確保することができる。

【0097】バネは、引っ張りバネであってもよく、図20に示したように、引っ張りバネ64の一端を筒状パッキング8によりカートリッジ2に挟み込み、他端を弁体10のインク室側表面に当接させて、弁体10をインク室側から筒状パッキング8の方向に向かって付勢力を与えることもできる。このようにすれば、弁体10にバネ保持部46等を設ける必要がなく、またインク誘導室36に案内部38を設置する必要もないため、構造を簡略化でき、製造工程が削減される。

【0098】図21及び図22は、弁体の他の実施例を示す。弁体70は、筒状パッキング8のインク室側の表面に弾接する弁体部72と、弁体部72が筒状パッキング8と弾接するよう弁体部72を保持する保持部74とを有している。この保持部74は硬質ゴム又、弾性率の高い高分子素材、又はエラストマー等の弾性材によって形成されており、インク供給針104が筒状パッキング8と嵌合して弁体70の弁体部72を押圧すると、それによって弾縮可能である。弁体部72は保持部74と別体で形成されてもよく、保持部74と一体で弾性材によ

って形成されてもよい。このようにすると、保持部74が、弁体部72を筒状パッキング8のインク室側の表面に弾接させると共に、弁体部72を筒状パッキング8に対して実質的に垂直に進退可能にガイドするガイド部材としても働くため、部品点数を削減することができる。

【0099】また、弁体70は、図21に示したように複数（ここでは3つ）の保持部74を有していてもよく、また図22に示したように1つの保持部74を有していてもよい。

【0100】図23（A）及び23（B）は、弁体の他の実施例を示す。弁体80は、筒状パッキング8のインク室側の表面に弾接する弁体部82と、弁体部82を筒状パッキング8に弾接させる弾性部材84とを有している。ここで弾性部材とは、ゴムなどの伸縮可能な部材である。図23（A）に示した例では、弁体部82は筒状パッキング8のインク室側の表面に形成された凹部30に連結された弾性部材84によって、選択的に筒状パッキング8に弾接されている。図23（B）に示したように、記録装置のインク供給針104の進入により、弁体部82がインク室の方向に押圧される。このため、弁体80の封止が解除され、インク室からのインクがインク供給針104の流入孔に流入し、記録装置の記録ヘッド102に供給される。

【0101】また、弁体80は、図24（A）及び24（B）に示したように、弁体部82の一端が筒状パッキング8に固定されると共に、弾性部材84によって筒状パッキングに弾接するようにしてもよく、インク供給針104の進入により、弁体部82がインク室の方向に押圧されて筒状パッキング8の嚢部を開孔する。このため、インク室からのインクがインク供給針104の流入孔に流入し、記録装置の記録ヘッド102に供給される。

【0102】この場合、弁体80は、筒状パッキング8と一体で形成されてその一部が筒状パッキング8に固定されているようにしてもよい。このようにすると、部品点数を減らすことができ、作業工程が削減される。

【0103】また弁体10は、図25（A）乃至（D）に示したように、弁体部40のインク供給針104と押接する表面側に、切込部を形成してもよい。図25

（A）及び（B）の切込部はインク供給針104のテーパ部と同角度に切り込まれている。また、図25（C）及び（D）の切込部はインク供給針104のテーパ部よりも鋭角となるように切り込まれている。このようにすると、インク供給針104が弁体10を押圧する際のインク供給針104への衝撃を少なくすることができる。特に、図25（C）及び（D）に示した例においては、インク供給針104が弁体10を押圧する際にも、インク供給針104の先端が弁体部40に接しないため、インク供給針104の先端部を傷めることがない。

【0104】さらに、図26に示したように、筒状パッ

キング8には、インク供給針104の周囲に嵌合する嵌合部が2つ形成されていてもよい。このようにすると、2つの嵌合部28a及び28bそれぞれがインク供給針104と嵌合するため、筒状パッキング8とインク供給針104とによる液密状態がより高度に保たれる。この場合、2つの嵌合部28a及び28bは、それぞれ嚢部を有していても有していなくてもどちらでもよい。外部開口側の嵌合部28aは、嚢部を有していないことが好ましい。そうすれば、カートリッジが記録装置に装着される使用前の段階において、この外部開口側の嵌合部28aがインクを密封することができる。このようにすると、封止フィルム等でインク供給口6を封止する必要がないため、部品点数を減らすことができ、作業工程が削減される。さらに、嵌合部28aはテーパ状で、使用前の段階でも、その中心は薄く形成されているため針の挿通が容易に行われる。

【0105】また、上述の実施例においてはキャリッジに搭載されるインクカートリッジに例を採って説明したが、キャリッジには記録ヘッドだけを搭載し、インクカートリッジを函体側に設置してインク供給チューブによりカートリッジのインクを記録ヘッドに供給する記録装置におけるインクカートリッジとインク供給チューブとを接合する場合のように、オフキャリッジ型のインクカートリッジに適用しても同様の作用を奏することは明らかである。

【0106】さらに、記録ヘッドの圧力発生室のインク加圧手段として圧電振動子を用いるタイプの記録装置に加えて、インク加圧手段として発熱素子を用いるタイプの記録装置に適用しても同様の作用を奏する。

【0107】

【発明の効果】本発明の第一の形態によれば、先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、記録ヘッドにインク供給針を介して連通可能であり、かつ記録ヘッドに対して着脱可能なインクカートリッジが、インクを収容するインク室と、外部開口を有し、インク室から記録装置の記録ヘッドにインクを供給するインク供給口と、インク供給口内に設置され、インクを通過させるインク流路を形成すると共に記録装置のインク供給針と嵌合する筒状パッキングと、インク供給口内に収容され、筒状パッキングと弾接してインク流路を、インク供給針の移動に呼応して選択的に封止する弁体と、を備えるため、筒状パッキングの封止力を低下させることなく、記録装置に装着されない非使用時にはインク供給口を確実に封止し、また記録装置に装着する使用時には、インク供給針によって確実に開弁することができるインクカートリッジを提供することができる。

【0108】このインクカートリッジは、記録装置のインク供給針の進入によりインク供給針が筒状パッキングと液密状態を形成すると略同時に、インク供給針が弁体

を押圧してインク室からのインクの供給を可能とするため、インク室内にエアや気泡が入ることなく、インク供給室からのインクをインク供給針に導入することができる。

【0109】また、このインクカートリッジは、記録装置のインク供給針と筒状パッキングとが液密状態を保持できる限界点まで記録装置のインク供給針が後退すると略同時に、弁体が筒状パッキングを封止するため、インク室内にエアや気泡が入ることなく、インクカートリッジのインク供給口を封止することができる。

【0110】インクカートリッジのインク室には、インクを含浸する多孔質部材が収容されていて、インクカートリッジ内には常時負圧が発生している場合であっても、弁体が筒状パッキングを封止するため、インク室内にエアや気泡が入ることなく、インクカートリッジのインク供給口を封止することができる。

【0111】筒状パッキングのインク室側の表面に筒状凸部が形成されているので、この凸部と弁体とが接触して液密状態を形成し、インク供給口を封止することができる。

【0112】筒状パッキングのインク室側の表面に弁体の一部を収容する筒状凹部が形成されていれば、この凹部と弁体とが弾接して液密状態を形成し、インク供給口を封止することができる。また筒状パッキングの筒状凹部に、該筒状凹部よりも小径の襷部が形成されているため、インク供給針と筒状パッキングの嵌合が可能となる。

【0113】弁体は、実質的に平板状であるため、筒状パッキングと弾接して液密状態を形成する。弁体は、筒状パッキングのインク室側の表面に弾接するとともに記録装置のインク供給針と当接する弁体部と、弁体部を筒状パッキングに対してほぼ垂直に移動可能にガイドするガイド部材と、を備えているため、弁体部がガイド部材によってガイドされ、弁体が筒状パッキングに対して垂直に移動可能となる。

【0114】弁体は、筒状パッキングのインク室側の表面に弾接するとともに記録装置のインク供給針と当接する弁本体と、該弁本体を筒状パッキングのインク室側の表面に付勢する圧縮バネ等の弾性部材と、を備えているため、確実にインク供給口を封止することができる。

【0115】弁本体が、弾性部材を保持する保持部、又はフランジを有しており、保持部が放射状であれば、弾性部材が確実に保持されるため、弁体が筒状パッキングに対して安定に進退可能となる。

【0116】筒状パッキングの外部開口側の表面に記録装置のインク供給針をガイドするテーパ部が形成されているため、インク供給針がスムーズに筒状パッキングに挿入される。またこのテーパ部がインク供給針の周囲に嵌合すると、インク供給針と筒状パッキングの液密状態が確実に形成され、インク供給口が封止される。また、

筒状パッキングの外部開口側の表面に記録装置のインク供給針の周囲に嵌合する嵌合部が形成されているためインク供給針と筒状パッキングとの液密状態が確実に形成される。

【0117】筒状パッキングが弾性材料により構成され、少なくともインク供給針が接する領域に滑面剤の層が形成されているので、インク供給針がスムーズに筒状パッキングに挿入される。

【0118】弁体部は、該弁体部が筒状パッキングと弾接するときインク室からのインクを封止する封止部と、弁体部が記録装置のインク供給針に押圧されて筒状パッキングと距離を隔てたときインク室からのインクを通過させるインク流路と、を有しているため、弁体部が筒状パッキングに弾接する時には封止部によりインク供給口が封止され、弁体部が筒状パッキングから位置を隔てた時は、インク流路からインクが通過して、インク供給針にインクが供給される。インク流路は封止部を切除して形成されているため、作業工程が容易となる。封止部は平板状であるため、筒状パッキングと弾接して液密状態を形成する。

【0119】ガイド部材は、弁体部に接続された軸と、該軸の自由端側に形成され、弁体部を筒状パッキングに対してほぼ垂直に移動可能にガイドする抜止部と、を有しているため、弁体部が筒状パッキングに対して垂直に移動可能となる。ガイド部材の軸が、弁体部と一体に形成されていれば、作業工程が容易となる。

【0120】このインクカートリッジが、インク供給口に設置された案内部を有していれば、ガイド部材の抜止部と係合して弁体部を筒状パッキングに対してほぼ垂直に移動可能にガイドすることができる。

【0121】弁体部とガイド部材とが二体構造として構成され、固着手段により固着されれば、組立工程が容易となる。弁体部とガイド部材とが一体に形成され、ガイド部材が弾性材により形成されると共に抜止部から軸に沿って溝を有していれば、案内部への装着が容易に行える。

【0122】弁体の弁体部の筒状パッキングに当接する面に凸状部又は球面部が形成されているので、弁体の姿勢が若干傾いた際にも封止力を確保することができる。弁体の球面部の曲率直径が、弁体部を筒状パッキングに対して水平な面で切断した際の最大直径より大きい場合、弁体の姿勢が傾いた際の封止力をより確実にすることができる。また、球面部の曲率直径が大きいため、筒状パッキングに弁体が押し込まれることがなく筒状パッキングの封止力が低下することもない。

【0123】弁体の弁体部の筒状パッキングに対向する面にインク供給針の先端に接触する突起が形成されているので、インク供給針が筒状パッキングと液密状態を形成すると同時に、弁体がインク供給針に押圧されてインクが供給されるため、インク供給口内にエアや気泡の混

入を防ぐことができる。

【0124】 弁体の弁体部の筒状パッキングに対向する面に切込部が形成されていれば、インク供給針への衝撃を減少することができ、インク供給針の耐久性を高めることができる。

【0125】 筒状パッキングのインク室側の表面に、記録装置のインク供給針の外周よりも小径の貫通孔を持つ環状凸部が形成されていれば、弁体と筒状パッキングとの液密状態が確実に形成される。

【0126】 弁体は、筒状パッキングのインク室側の表面に弾接するとともに記録装置のインク供給針と当接する弁体部と、弁体部の一部を筒状パッキングのインク室側の表面に弾力的に固定する弾性固定部材と、を備えており、弾性固定部材が、弁体部と一体で形成されていれば、部品点数を減らすことができ、作業工程が削減される。

【0127】 筒状パッキングをインク供給口の外部開口に固定する固定手段を有していれば、筒状パッキングが確実にインク供給口に固定される。

【0128】 嵌合部が、記録装置のインク供給針が外部開口から進入するとき、インク供給針と最初に嵌合する第1の嵌合手段と、インク供給針がさらに進入したとき、インク供給針と嵌合する第2の嵌合手段とから構成されれば、インク供給針と筒状パッキングとの嵌合がより確実となる。また、その第1の嵌合手段が、初期段階でシールされていれば、別途封止フィルムなどを設ける必要がなく、部品点数を減少することができ、作業工程が削減される。

【0129】 本発明の第二の形態によれば、先端がテーパ状に形成されたインク供給針を介して記録ヘッドにインクを供給する記録装置に用いられ、記録ヘッドに供給針を介してインク収容部のインクを供給可能なインク供給システムが、インク収容部から記録装置の記録ヘッドにインクを供給するインク供給路と、インク供給路に設置され、インクを通過させるインク流路を形成すると共に記録装置のインク供給針と嵌合する第一部材と、インク供給路に収容され、第一部材と弾接してインク流路を選択的に封止する第二部材と、を備えるため、封止力を低下させることなく、記録装置に装着されない非使用時にはインク流路を確実に封止し、また記録装置に装着する使用時には、インク供給針によって確実に開弁することができるインク供給システムを提供することができる。

【0130】 本発明の第三の形態によれば、記録紙に対してインクを吐出させて記録する記録装置が、記録ヘッドと、先端がテーパ状に形成されたインク供給針と、及び記録ヘッドにインク供給針を介して連通可能であり、かつ記録ヘッドに対して着脱可能なインクカートリッジと、を有し、インクカートリッジが、インクを収容するインク室と、外部開口を有し、該外部開口を介してイン

ク室から記録装置の記録ヘッドにインクを供給するインク供給口と、インク供給口に設置され、インクを通過させるインク流路を有すと共に記録装置のインク供給針と嵌合する筒状パッキングと、インク供給口に収容され、筒状パッキングと弾接してインク流路を選択的に封止する弁体と、を備えるため、筒状パッキングの封止力を低下させることなく、記録装置に装着されない非使用時にはインク供給口を確実に封止し、また記録装置に装着する使用時には、インク供給針によって確実に開弁することができるインクカートリッジを有する記録装置を提供することができる。

【図面の簡単な説明】

【図1】 本発明のインクカートリッジの一実施例を、記録ヘッドにインク供給可能な状態で示す断面図である。

【図2】 図1に示したインクカートリッジのインク供給口近傍を拡大して示す断面図である。

【図3】 図2に示したインクカートリッジの弁体の一実施例を示す斜視図である。

【図4】 図2に示したインクカートリッジに記録装置のインク供給針が挿入される過程を示す断面図である。

【図5】 本発明のインクカートリッジの他の実施例と、そのカートリッジに記録装置のインク供給針が挿入される過程を示す断面図である。

【図6】 本発明のインクカートリッジの他の実施例と、そのカートリッジに記録装置のインク供給針が挿入される過程を示す断面図である。

【図7】 本発明のインクカートリッジの他の実施例と、そのカートリッジに記録装置のインク供給針が挿入される過程を示す断面図である。

【図8】 弁体の他の実施例を示す断面図である。

【図9】 弁体の他の実施例を示す斜視図及び断面図である。

【図10】 弁体の他の実施例を示す断面図である。

【図11】 弁体の他の実施例を示す斜視図である。

【図12】 インク誘導室の一実施例を示す断面図である。

【図13】 インク供給口の筒状パッキング固定手段の一実施例を示す断面図及び斜視図である。

【図14】 インク供給口の筒状パッキング固定手段の他の実施例を示す斜視図である。

【図15】 インク供給口の筒状パッキング固定手段の他の実施例を示す断面図及び斜視図である。

【図16】 インク供給口の筒状パッキング固定手段の他の実施例を示す断面図及び斜視図である。

【図17】 本発明のインクカートリッジの他の実施例をインク供給口付近を拡大して示す断面図である。

【図18】 本発明のインクカートリッジの他の実施例をインク供給口付近を拡大して示す断面図である。

【図19】 図18に示す弁体の他の実施例を示す断面図である。

【図20】引っ張りバネが設けられたインクカートリッジを示す断面図である。

【図21】弁体の他の実施例を示す側面図及び斜視図である。

【図22】弁体の他の実施例を示す側面図及び斜視図である。

【図23】弁体の他の実施例を示す断面図である。

【図24】弁体の他の実施例を示す断面図である。

【図25】弁体の他の実施例を示す断面図である。

【図26】筒状パッキングの他の実施例を示す断面図である。

【図27】従来のインクカートリッジの一例を示す断面図である。

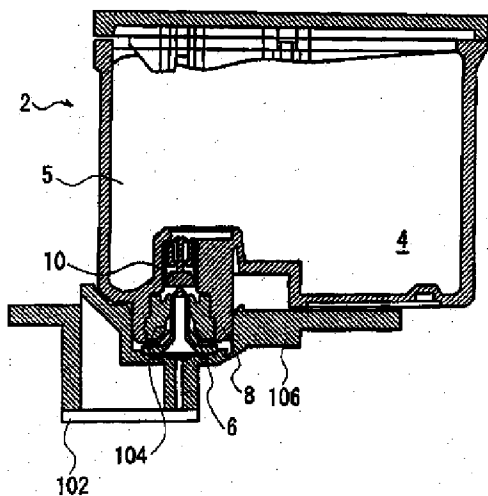
【図28】従来のインクカートリッジの他の例を示す断

面図である。

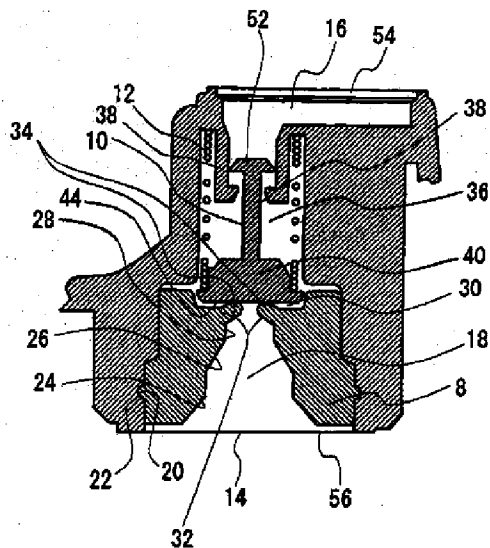
# 【符号の説明】

- 2 インクカートリッジ
- 4 インク室
- 6 インク供給口
- 8 筒状パッキング
- 10 弁体
- 12 バネ
- 32 壁部
- 36 インク誘導室
- 40 弁体部
- 44 封止部
- 104 インク供給針

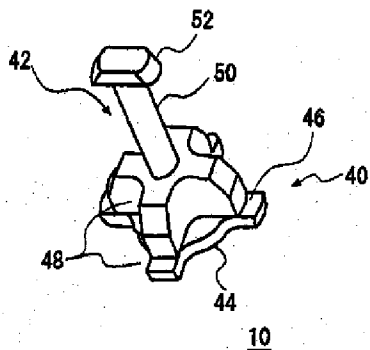
【図1】



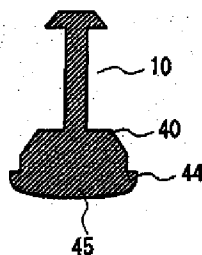
【図2】



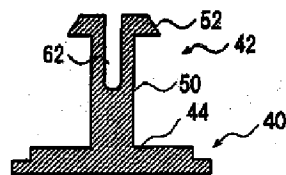
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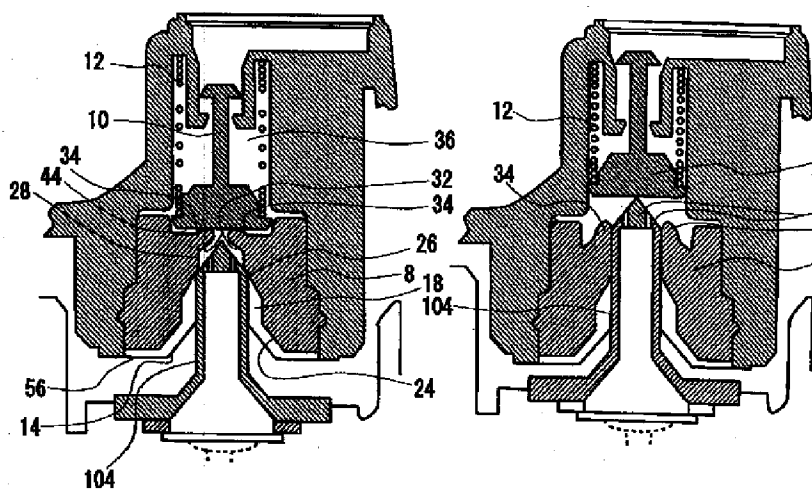
【図8】



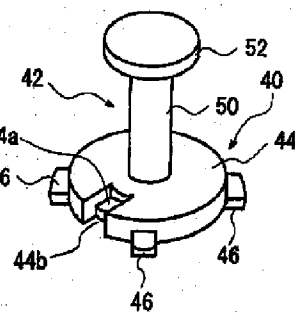
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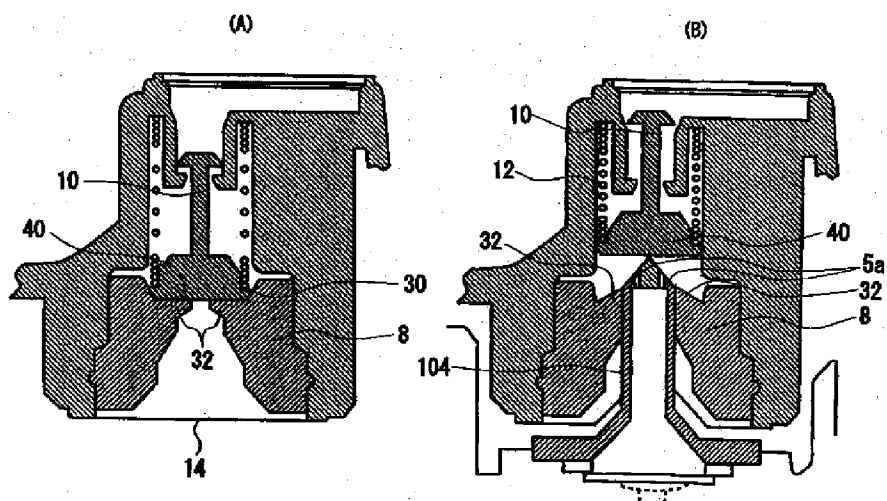
【図 4】



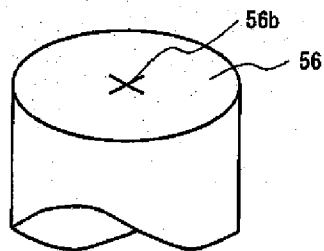
【図 11】



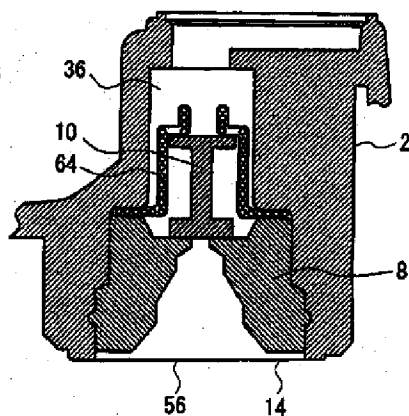
【図 5】



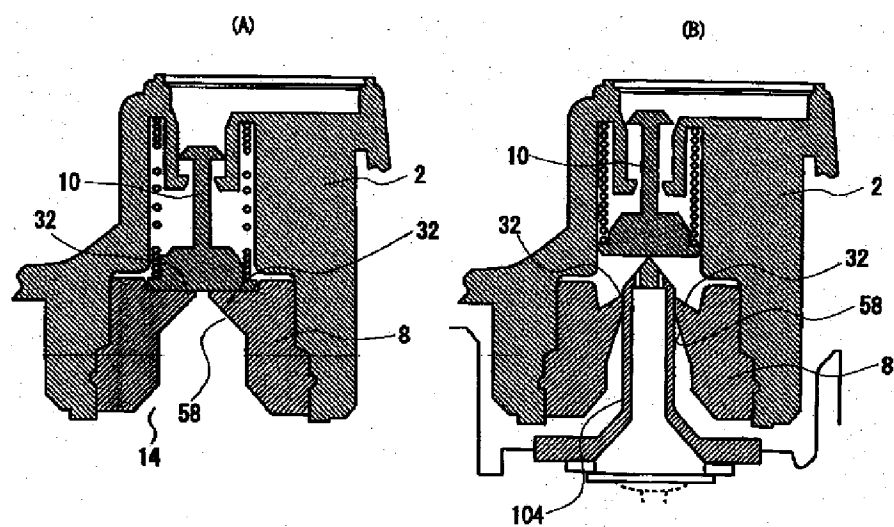
【図 14】



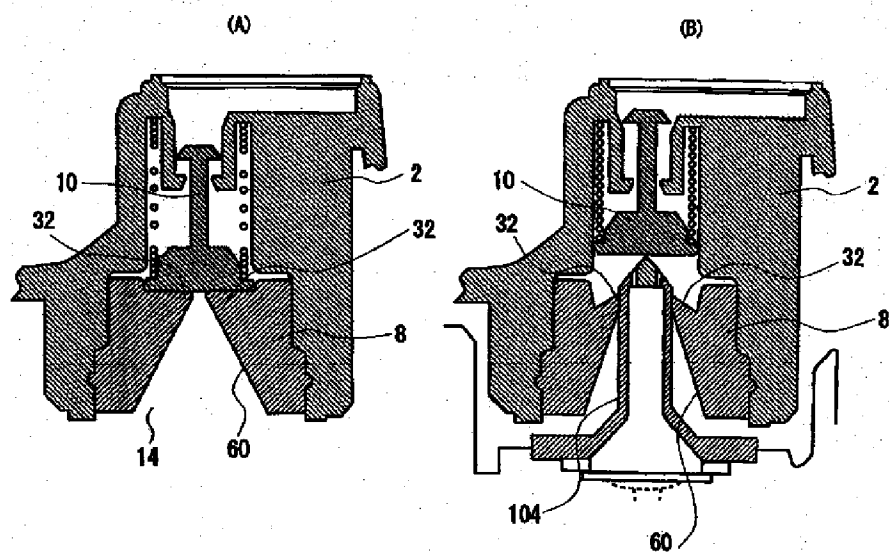
【図 20】



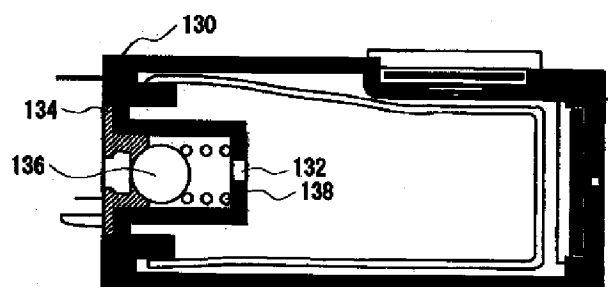
【図 6】



【図 7】

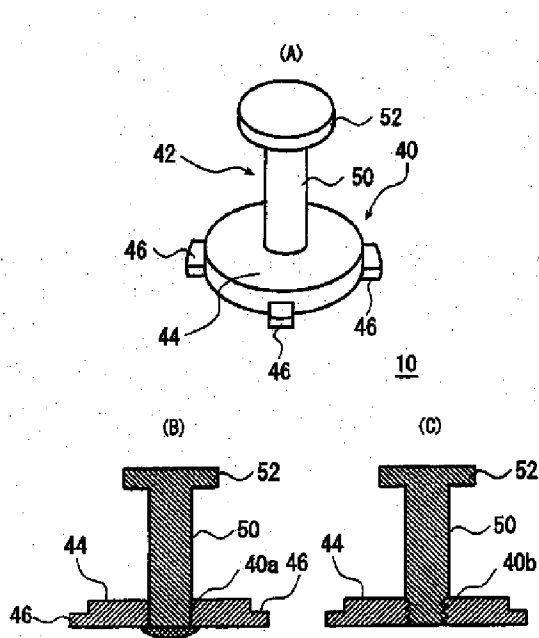


【図 28】

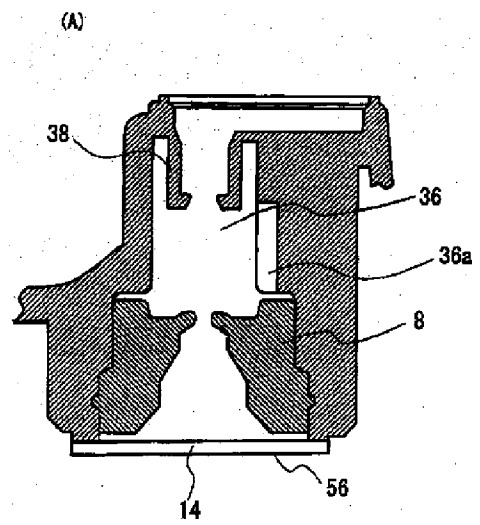




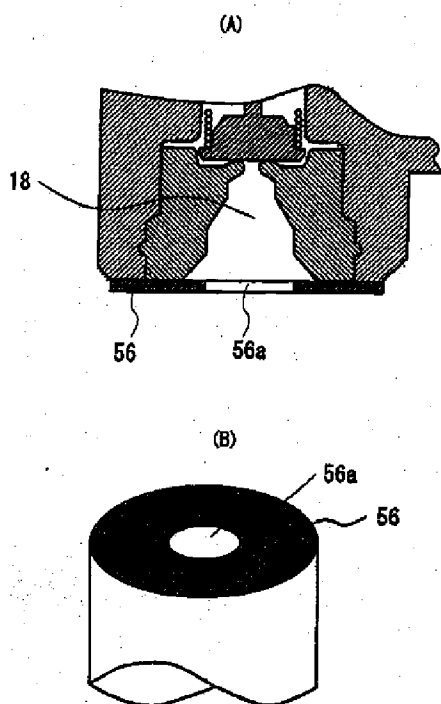
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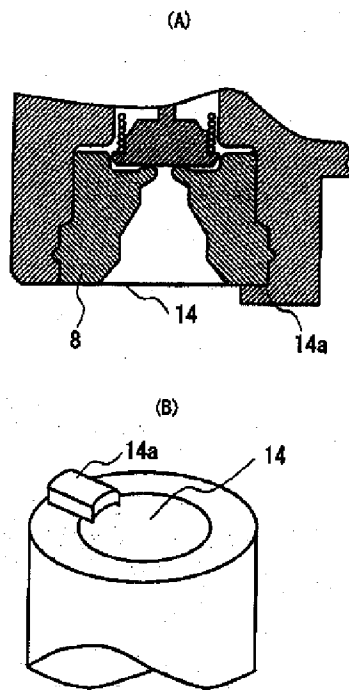
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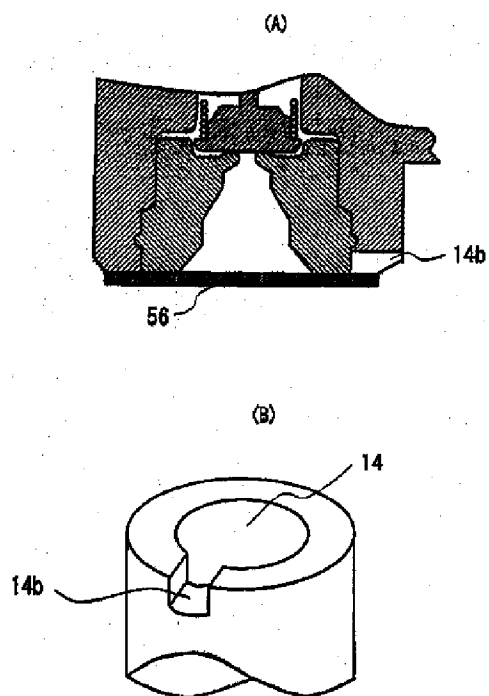
【図 13】



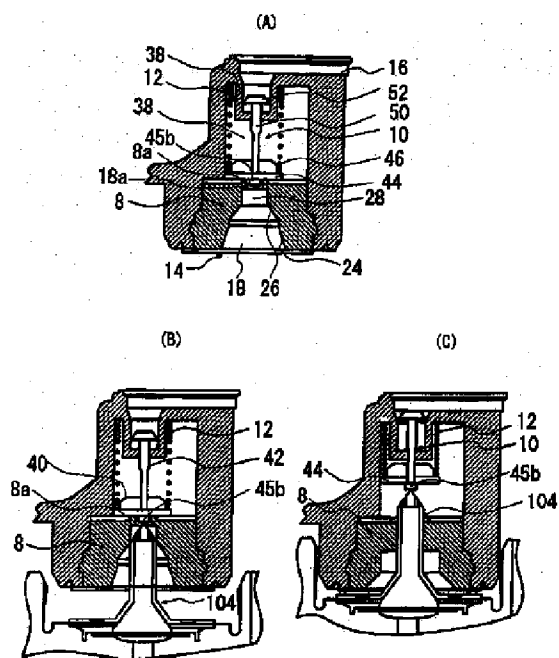
【図 15】



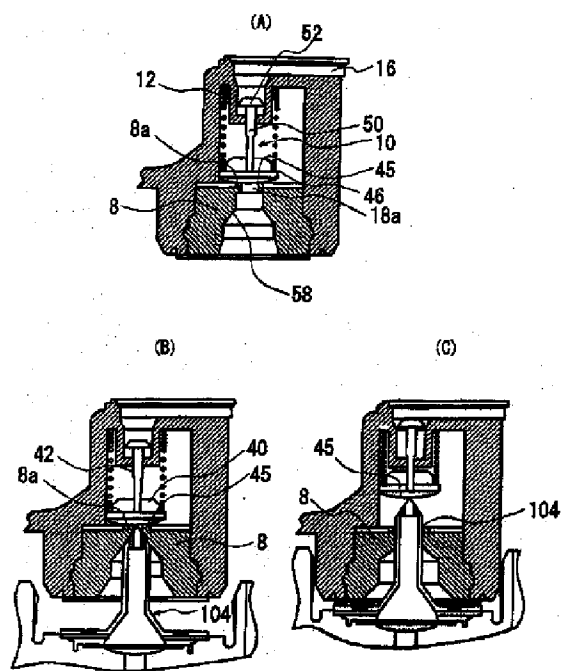
【図16】



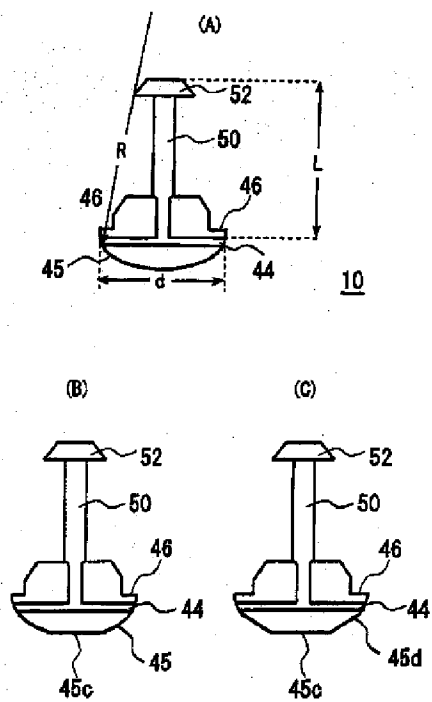
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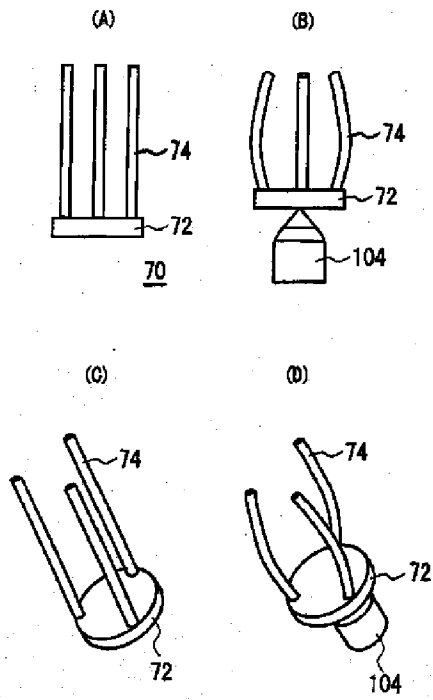
【図18】



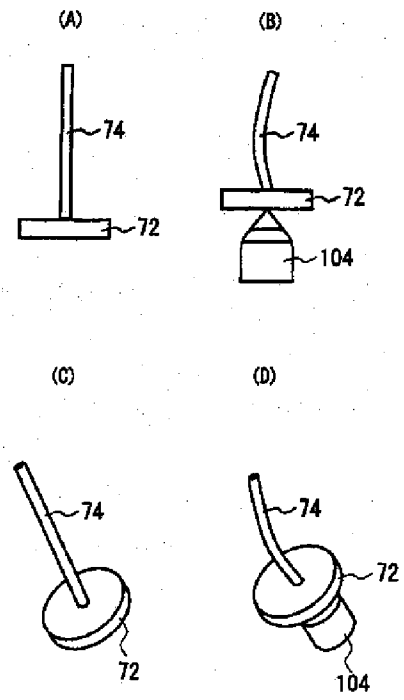
【図19】



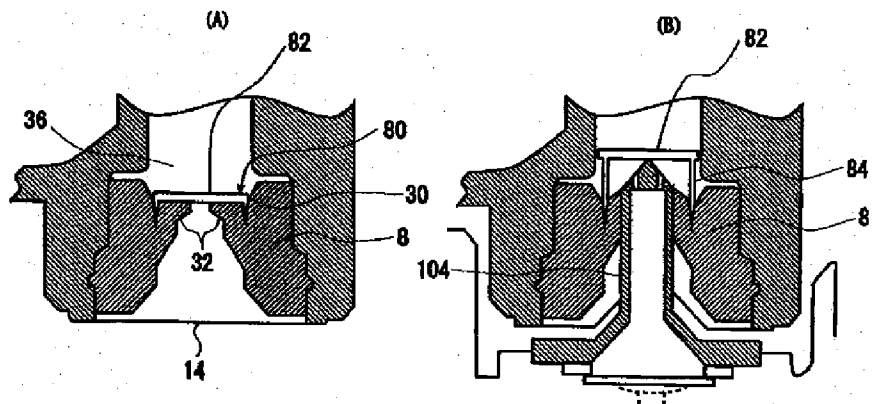
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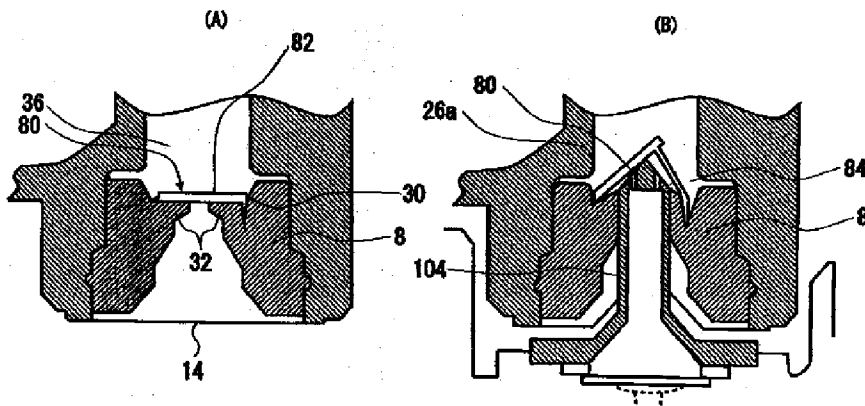
【図 2 2】



【図 2 3】

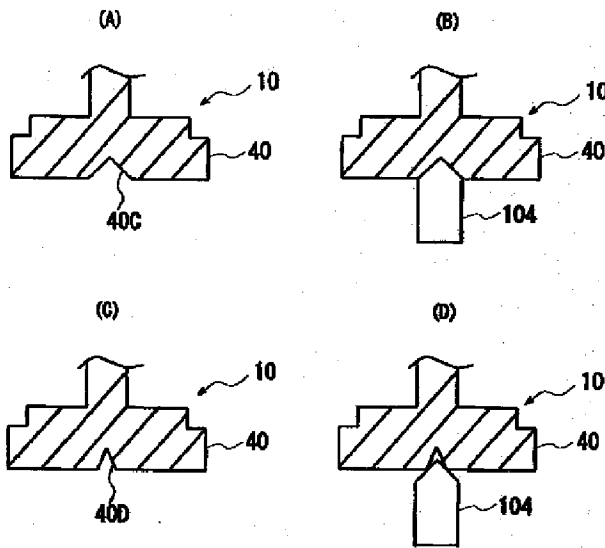


【図24】

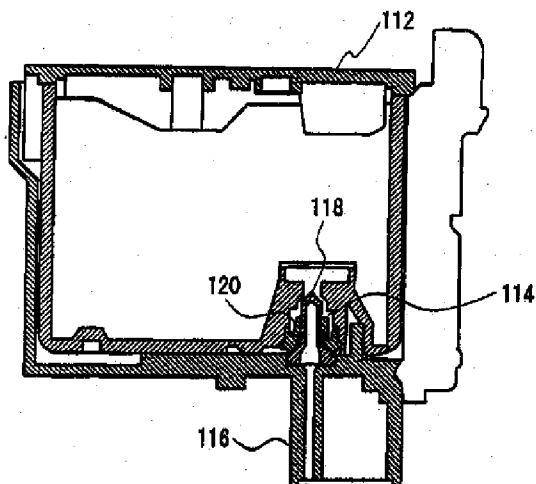
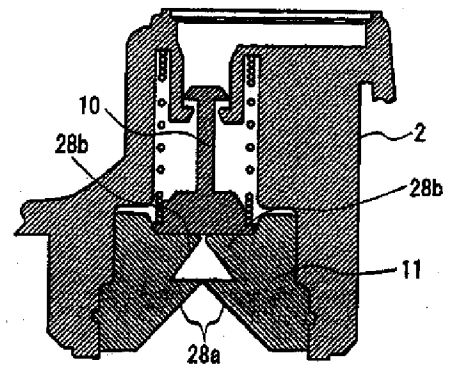


【図25】

【図26】



【図27】



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Fターム(参考) 2C056 EA26 FA10 KB05 KB08 KB27  
KC01 KC05 KC11